A Critical Assessment of Physical Activity and Sedentary Behaviour Policies

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Abstract

It is well established that physical inactivity is one of the main behavioural risk factors for noncommunicable diseases (NCDs). Research on sedentary behaviour (SB; i.e., sitting or reclining with low energy expenditure during waking hours) has grown rapidly in the past two decades, after epidemiological evidence indicated that high levels of sitting may pose a health risk. Research on physical activity (PA) and SB policies is considered underdeveloped, compared with other areas of PA and SB research. This thesis, therefore, aimed to: (1) map the evidence on indicators, development, and content of national PA and SB policies globally (Study 1); (2) develop a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework (Study 2); (3) identify and critically assess available instruments for the analysis of national-level PA and SB policies (Study 3); and (4) analyse the availability, comprehensiveness, implementation, and effectiveness of current national-level PA and SB policies globally (Study 4). To achieve the aim of Study 1, a systematic scoping review of indicators, development, and content of national PA and SB policies was conducted. The achieve the aim of Study 2, an extensive review of literature, an open discussion between the authors, three rounds of a Delphi process, and two-rounds of consultations with PA policy stakeholders were employed in the development of the CAPPA framework. To achieve the aim of Study 3, a systematic review of instruments for national-level PA and SB policies was conducted, and the identified instruments were assessed against the CAPPA framework. To achieve the aim of Study 4, a survey was developed based on Study 3 findings and according to the CAPPA framework. PA policy experts from 173 countries (n = 76; response rate = 44%) were then asked to provide data on their national PA and SB policies by completing the survey. Study 1 found that PA policy research is much more developed than it was considered several years ago and that research on SB policies is still in its infancy. The following research gaps were identified: (i) there is a lack of PA and SB policy research in low- and middle-income countries; (ii) the definitions of PA and SB policies varied significantly across studies; (iii) most studies did not rely on any conceptual or theoretical framework; and (iv) studies have used a variety of methods to analyse PA and SB policies which may cause problems with comparability. The CAPPA framework, developed in Study 2, provides a novel definition of PA policy, which, if widely adopted, will help to standardise the scope and language used in future research. The CAPPA framework developed in Study 2 specifies 38 elements of a comprehensive

analysis of PA policies in the following six categories: *purpose of analysis; policy sector; type of policy; stage of policy cycle;* and *scope of analysis.* It can be used to guide future studies related to PA and SB policy and provide a context for the analysis of its specific components. Study 3 found 16 instruments for PA policy analysis. Only two instruments include questions about SB policy and none of the instruments allows for the analysis of all the relevant components of national PA and SB policy. Therefore, developing new instruments or adapting existing ones is needed to enable a more thorough analysis of national PA and SB policies. Study 4 found that most countries have formal written PA policies, guidelines for PA, quantifiable national targets for PA, and PA surveillance or monitoring. However, the levels of comprehensiveness, implementation, and effectiveness of national PA policies are largely low-to-moderate. Compared with PA policies, SB policies are less available, comprehensive, implemented, and effective. Both PA and SB policies are more developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of the European and Western-Pacific regions, compared with other world regions. Future studies should aim to focus more on low- and middle-income countries and countries from the African and Eastern Mediterranean regions. Comprehensive analyses of PA and SB policy, considering all elements specified in the CAPPA framework, are needed to facilitate PA and SB policy research, and the development and implementation of comprehensive and effective PA and SB policies.

Student declaration

"I, Bojana Klepac Pogrmilovic, declare that the PhD thesis entitled *A Critical Assessment of Physical Activity and Sedentary Behaviour Policies* is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature 

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PART A:

DETAILS OF INCLUDED PAPERS: THESIS BY PUBLICATION

Please list details of each Paper included in the thesis submission. Copies of published Papers and submitted and/or final draft Paper manuscripts should also be included in the thesis submission

Item/ Chapter No.	Paper Title	Publication Status (e.g. published, accepted for publication, to be revised and resubmitted, currently under review, unsubmitted but proposed to be submitted)	Publication Title and Details (e.g. date published, impact factor etc.)
4	A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies	published	International Journal of Behavioral Nutrition and Physical Activity (Q1), date published: 28.11.2018, impact factor: 5.548
5	The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework	published	International Journal of Behavioral Nutrition and Physical Activity (Q1), date published: 02.08.2019, impact factor: 5.548
6	A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies	published	Health Research Policy and Systems (Q1), date published: 13.11.2019, impact factor: 2.420
7	National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness	published	International Journal of Behavioral Nutrition and Physical Activity (Q1), published: 18.09.2020, impact factor: 5.548

Declaration by [candidate name]: Bojana Klepac Pogrmilovic **Signature:** [redacted] **Date:** 1 October 2020

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Citation of included papers

Chapter 4

Klepac Pogrmilovic, B., O'Sullivan, G., Milton, K. *et al.* A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies. *Int J Behav Nutr Phys Act* **15,** 123 (2018). https://doi.org/10.1186/s12966-018-0742-9

Chapter 5

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Chapter 6

Klepac Pogrmilovic, B., O'Sullivan, G., Milton, K. *et al.* A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies. *Health Res Policy Sys* **17,** 86 (2019). https://doi.org/10.1186/s12961-019-0492-4

Chapter 7

Klepac Pogrmilovic, B., Ramirez Varela, A., Pratt, M. *et al.* National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness. *Int J Behav Nutr Phys Act* **17,** 116 (2020). https://doi.org/10.1186/s12966-020-01022-6

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List of Abbreviations

ADEPT	Analysis of Determinants of Policy Impact
AFRO-PAN	Africa Physical Activity Network
AHK	Active Healthy Kids
APA	American Psychological Association
APPAN	Asia Pacific Physical Activity Network
CAPPA	Comprehensive Analysis of Policy on Physical Activity
CDC	Centers for Disease Control and Prevention
CI	confidence interval
EU	European Union
GAPA	Global Advocacy for Physical Activity
GoPA!	Global Observatory for Physical Activity
HEPA	Health-enhancing physical activity
HEPA PAT	Health-Enhancing Physical Activity Policy Audit Tool
IHES	Institute for Health and Sport
IJBNPA	International Journal of Behavioral Nutrition and Physical Activity
ISBNPA	International Society of Behavioral Nutrition and Physical Activity
ISPAH	International Society for Physical Activity and Health
MET	metabolic equivalent
NCD	noncommunicable disease
NGO	nongovernmental organisation
PA	physical activity
RAFA-PANA	Red Actividad Fisica de las Americas/Physical Activity Network of the Americas
SB	sedentary behaviour
SBRN	Sedentary Behaviour Research Network
SPSS	Statistical Package for the Social Sciences
UK	United Kingdom
UN	United Nations
USA	United States of America
VIRTUE	Viable Integrative Research in Time-Use Epidemiology
WHO	World Health Organization

1. Introduction

Physical activity (PA) is defined as "any bodily movement produced by skeletal muscles that requires energy expenditure" (Caspersen, Powell, & Christenson, 1985). For more than sixty years, PA research has been informing the development of health policy. The lack of PA has been identified as the fourth major risk factor contributing to global mortality after high blood pressure (13%), smoking (9%), and high blood glucose levels (6%) (World Health Organization, 2009). The estimates show that physical inactivity is the main cause for the global burden of almost 30% of diabetes, from 21% to 25% of colon and breast cancer, and around 30% of ischaemic heart disease (World Health Organization, 2018a). In 2008, global estimates held physical inactivity accountable for 9% of deaths in that year (Lee et al., 2012). Moreover, physical inactivity is also a tremendous economic burden for countries' health care systems. According to Ding et al. (2016), in 2013 the estimated cost of physical inactivity to health-care systems around the world was 53.8 billion international dollars. Besides "irrefutable" health benefits (Warburton & Bredin, 2016), physical activity also has various psychological, social, economic, and ecologic benefits (Pedišić, 2011). PA can be classified using the FITT principle. F is *frequency* (e.g. PA is performed twice a week), I is *intensity* (e.g. light-, moderate, and vigorous-intensity) and T is *time* spent in the activity (e.g. 20 minutes) and *type* (Rhodes, Janssen, Bredin, Warburton, & Bauman, 2017). According to *type* PA can be, for example, anaerobic or aerobic (e.g. weight lifting or running). PA can also be classified according to the domain in which it takes place, such as transport, leisure-time, work, and domestic (Rhodes et al., 2017).

Sedentary behaviour (SB) is defined as "any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture" (Tremblay et al., 2017). SB research is a relatively novel field of behavioural epidemiology. Interest in the SB research area experienced a rapid growth from the early-to mid-2000s, after epidemiological evidence indicated that higher amounts of sitting might pose a health risk, potentially irrespective of one's PA level (Owen, Bauman, & Brown, 2009). Global estimates indicate that SB can be held accountable for 3.8% of deaths from 2002 to 2011 (de Rezende et al., 2016). SB can

be classified by domains (e.g. transport, work, leisure time, domestic) or types (e.g. TV watching).

Evidence shows that reduced time spent in SB and increased participation in PA can contribute to substantial risk reduction for all-cause mortality and NCDs (e.g. breast cancer, cardiovascular disease, type 2 diabetes, colon cancer, osteoporosis) (Katzmarzyk, 2010). The World Health Organization (WHO) recommendations on PA outline that adults should engage in at least: (i) 150 minutes per week of moderate-intensity aerobic PA or 75 minutes per week of vigorous-intensity aerobic PA (or their equivalent combination) in any of the domains; and (ii) two sessions per week of muscle-strengthening activities (World Health Organization, 2010a). Some national public health guidelines also include recommendations to avoid SB and reduce the number of prolonged bouts of SB (Kahlmeier et al., 2015). In a new *Global Action Plan on Physical Activity 2018-2030: More active people for a healthier world* (World Health Organization, 2018b), the WHO urged its member states, and especially their governments, to take "policy actions" to reduce physical inactivity and SB levels. While the evidence on prevalence, determinants, trends, and health outcomes of SB is rapidly evolving, the implementation of SB policies is limited and research on SB policies seems to be scarce (Coenen, Gilson, Healy, Dunstan, & Straker, 2017). Research on PA policies is much more advanced compared with research on SB policies, but it is still significantly less developed than research on health outcomes, determinants, and surveillance of PA (Ramirez Varela et al., 2018a).

Furthermore, new evidence and societal advances over time motivate cyclic changes in PA policies (Milton & Bauman, 2015). Global progress in increasing PA levels seems to be slow mainly due to lack of investment and awareness (World Health Organization, 2018b). Ongoing policy research is needed to provide an up-to-date assessment of current national PA and SB policies. A critical analysis of relevant PA and SB policies can considerably contribute to: (i) meeting health objectives (Buse, Dickinson, Gilson, & Murray, 2009), that is, increasing PA and reducing SB; (ii) raising awareness of the existing best practice, prospects, and gaps; (iii) promoting cross-level and cross-sectoral discussions (Bull, Milton, & Kahlmeier, 2014a); (iv) informing future development of PA and SB policies; and (v) assisting decision makers in making better informed policies, regulations, and decisions (Quade & Carter, 1989).

Therefore, the main research question of this thesis is: *What is availability, comprehensiveness, level of implementation, and effectiveness of the current PA and SB policies internationally?* The aim of this PhD research project was to: (1) map the evidence on indicators, development, and content of national PA and SB policies globally; (2) develop a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework; (3) identify and critically assess available instruments for the analysis of national-level PA and SB policies and provide recommendations for their future use; (4) audit and critically assess the availability, comprehensiveness, implementation, and effectiveness of current national-level PA and SB policies globally.

This thesis has eight chapters. Following this introduction, the second chapter is a literature review, which presents significant gaps in the current literature related to PA and SB policy research. The third chapter is dedicated to the overall research design and methodology and provides a rationale for why specific methods, theories, and/or frameworks were employed in each of the four main studies. The following four chapters are: (i) a global systematic scoping review critically assessing available research related to national-level PA and SB policies (Study 1, Chapter 4); (ii) the development of a new CAPPA framework (Study 2, Chapter 5); (iii) a systematic review critically assessing available instruments for the analysis of national-level PA and SB policies (Study 3, Chapter 6); and (iv) an international study auditing and assessing availability, comprehensiveness, implementation, and effectiveness of national-level PA and SB policies using a new *GoPA! Policy Inventory* tool (Study 4, Chapter 7). Chapter 8 discusses the main findings of this PhD research project and provides recommendations for future research and development of national-level PA and SB policies. Chapter 9 presents the most important conclusions from all four studies. A summary of the thesis structure is presented in Table 1.

Study 1 aimed to answer the following research questions:

- Which world regions and countries have been covered by research related to national PA/SB policies?
- How is 'policy' conceptualised within the PA/SB policy studies?

- To what extent were PA/SB policy studies based on theoretical/conceptual frameworks?
- Which methods have been employed for analysing PA/SB policies?
- What are the future directions of research in the PA/SB policy area?

Study 2 aimed to answer the following research questions:

- How should PA policy be defined?
- How should PA policy analysis be defined?
- Which elements of PA policy should be analysed to gain a comprehensive picture on its development?
- What types of PA policies can be analysed?
- Which sectors should be included in the comprehensive analysis of PA policy?

Study 3 aimed to answer the following research questions:

- Which instruments are available for PA and SB policy analysis?
- Based on the CAPPA framework, what are each instrument's characteristics?
  - Is the purpose of the instrument auditing or assessment of policies?
  - Which sectors does the instrument cover?
  - Which types of policies does the instrument cover?
  - Which stages of the policy cycle does the instrument address?
  - What is the scope of the policy analysis that can be conducted using the instrument?

Study 4 aimed to answer the following research questions:

- To what extent are national-level PA and SB policies available internationally across countries with different economic standards and within different world regions?
- To what extent are national-level PA and SB policies comprehensive across countries with different economic standards and within different world regions?
- To what extent are national-level PA and SB policies implemented across countries with different economic standards and within different world regions?

- To what extent are national-level PA and SB policies effective across countries with different economic standards and within different world regions?

Table 1. Chapter structure and publications included in the thesis

Chapter	Chapter title	Short chapter description	Study/publication information
1	Introduction	This chapter introduces key concepts and provides a general overview of the thesis.	
2	Literature Review	This chapter presents a narrative literature review of existing PA and SB policy research and key gaps in the current knowledge related to national-level PA and SB policies.	
3	Methodology	This chapter provides an overview of the research design and key methods, theories, and/or frameworks used in the thesis.	
4	A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies	This chapter comprises a systematic scoping review that provides a comprehensive insight into the international research on national PA and SB policies.	**Study 1**- Klepac Pogrmilovic, B. et al. (2018) *A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies*. IJBNPA. 15(123). available at: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-018-0742-9
5	The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework	This chapter comprises an original study focused on the development of the new conceptual framework for the analysis of PA policies. The study contains definitions of 8 categories and 38 elements of the CAPPA framework.	**Study 2** - Klepac Pogrmilovic, B. et al. (2019) *The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework*. IJBNPA. 16(60). available at: https://link.springer.com/content/pdf/10.1186/s12966-019-0822-5.pdf
6	A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies	This chapter provides an overview and critical assessment of available instruments for the analysis of national-level PA and SB policies. The assessment of the instruments is based on	**Study 3** - Klepac Pogrmilovic, B. et al. (2019) *A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies.* Health

		the CAPPA framework.	Research Policy and Systems.17(86). available at: https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-019-0492-4
7	National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness	This chapter presents the findings of an international audit and assessment of the availability, comprehensiveness, implementation, and effectiveness of national PA and SB policies conducted using the *GoPA! Policy Inventory* tool, version 3.0.	**Study 4** - Klepac Pogrmilovic, B. et al. (2020) *National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness.* IJBNPA. 17(116). available at: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-01022-6
8	Discussion	This chapter focuses on: the key findings and from all studies; implications and suggestions for future research and for decision makers; and the strengths and limitations of this thesis.	
9	Conclusion	This chapter presents the most important conclusions from all four studies.	

1.1. Significance and contribution to knowledge

This thesis advances knowledge in the field of PA and SB policy research and provides novel findings in the following major aspects:

(i) For the first time, the level of development of research related to national-level PA and SB policies internationally was reviewed and critically assessed (Study 1 - Review).

(ii) The only framework explicitly developed for PA policy research was developed in 2006. Since then, the PA policy research area has significantly grown. Within this thesis, a new framework was developed to guide future PA policy studies and provide a context for the analysis of its components. The CAPPA framework may be used in the same way for SB policy research (Study 2 - Original research).

(iii) For the first time, the available instruments for assessment and/or audit of national PA and SB policies were reviewed and critically assessed (Study 3 - Review).

(iv) Most previous studies have analysed PA and SB policies in high-income countries (a finding from Study 1). This thesis audits and critically assesses PA and SB policies from countries with different income levels and from all world regions (Study 4 - Original research).

(v) Broad international audit and assessment of availability, comprehensiveness, implementation, and effectiveness of PA and SB policies may enable the identification of good and bad practices and their correlates to inform the development of future policy recommendations. As such, the outcomes and the results may be of benefit to various communities around the world (Study 4 - Original research).

(vi) The newly developed instrument *GoPA! Policy Inventory version 3.0* and the CAPPA framework may be further used not only by PA and public health researchers but also by other public health stakeholders in the business sector, public administration, non-governmental organisations, and national and international associations and organisations involved in activities that include PA promotion and SB reduction. This may contribute to standardisation and comparability of findings for future PA and SB policy studies (Study 4 - Original research).

(vii) Most of the research conducted to date has been primarily focused on PA policies, while SB policy research is in its infancy (a finding from Study 1). This research actively integrates issues around SB polices into an academic discussion (all studies).

1.2. List of key definitions

Assessment is "grading, rating, judging, or evaluating policy" (Klepac Pogrmilovic et al., 2019a).

Audit is an "inquiry about a certain aspect of policy but not rating, grading, judging, or evaluating it" (Klepac Pogrmilovic et al., 2019a).

Instruments for PA and/or SB policy analysis are "*sets of criteria* and *measurement tools* that can be used for any aspect of PA/SB policy analysis. A *set of criteria* is a collection of principles that may serve as a guide for policy analysis. They usually do not include specific questions that may directly be used for PA/SB policy analysis. *Measurement tools* contain specific questions that may be used in various types of research related to PA/SB policies" (Klepac Pogrmilovic, O'Sullivan, Milton, Biddle, & Pedišić, 2019b).

Physical activity is "any bodily movement produced by skeletal muscles that requires energy expenditure" (Caspersen et al., 1985).

Physical inactivity is "an insufficient physical activity level to meet present physical activity recommendations" (Tremblay et al., 2017).

Physical activity policy is "indicated by the totality of formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and informal policies (or lack thereof) that may directly or indirectly affect community- or population-level PA" (Klepac Pogrmilovic et al., 2019a).

Physical activity policy analysis is "any kind of policy-relevant research that audits or assesses one or more aspects of PA policy" (Klepac Pogrmilovic et al., 2019a).

Policy analysis "is any form of policy-relevant research" (Hird, 2017, p. 44).

Public policy is "anything government chooses to do or not to do" (Dye, 2013), more specifically "a strategic action led by a public authority in order to limit or increase the presence of certain phenomena within the population" (National Collaborating Centre for Healthy Public Policy, 2012).

Sedentary behaviour is "any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture" (Tremblay et al., 2017).

Sedentary behaviour policy is "indicated by the totality of formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and

informal policies (or lack thereof) that may directly or indirectly affect community- or population-level" (Klepac Pogrmilovic et al., 2019a).

Sedentary behaviour policy analysis is "any kind of policy-relevant research that audits or assesses one or more aspects of SB policy" (Klepac Pogrmilovic et al., 2019a).

Definitions of *assessment*, *audit*, *physical activity policy*, and *physical activity policy analysis* were developed within Study 2, as a part of the development of the CAPPA framework (Chapter 5). Definitions of *instruments* and *tools* were developed within Study 3, a systematic review of instruments for PA and/or SB policy analysis (Chapter 6).

2. Literature Review

This chapter aims to present a broad overview of PA and SB policy research. After a general introduction to PA and SB policy research, each part of this chapter depicts the most relevant literature in the area while also concentrating on key gaps and challenges in knowledge around PA and SB policy research. The gaps and challenges related to the national-level PA and SB policy analysis are primarily addressed in Study 1 (Chapter 4) and Study 4 (Chapter 7). The gaps regarding the instruments for the analysis of national PA and SB policies are addressed in Study 2 (Chapter 5) and Study 3 (Chapter 6). The gaps related to the use of theoretical/conceptual frameworks in PA and SB policy research are addressed in Study 1 and Study 2. Finally, the gaps regarding standardisation of PA and SB policy research are predominantly addressed in Study 2 and Study 4.

2.1. Introduction to PA and SB policy research

The modern PA and public health research field started developing in the 1950s (Ramirez Varela et al., 2018a). At the time, the research was geographically centred around high-income countries of Western Europe and North America with a strong emphasis on health outcomes (Ramirez Varela et al., 2018a). PA policy research started developing relatively late compared to research related to PA health outcomes, PA measurement techniques, trends and levels, and determinants of PA (Ramirez Varela et al., 2018a). The first PA policy publication appeared in 1992 (Ramirez Varela et al., 2018a) and PA policy field experienced a stronger ascent only from 2000 when many countries made an effort to develop national policies related to PA (Bull, Bellew, Schoeppe, & Bauman, 2004a). Most of these developments were a consequence of a major turning point in the international policy initiatives related to PA - the development of the first *Global Strategy on Diet, Physical Activity and Health* led by the WHO (World Health Organization, 2004). A few years later, in 2011, another "major global effort related to PA policy" and planning occurred (Kohl et al., 2012, p. 395). In recognition of the importance of NCD prevention and control, the United Nations (UN) held a high-level meeting. At this meeting, PA was recognised as a significant determinant of NCDs, but it still received less attention than alcohol, diet, and tobacco (Kohl et al., 2012).

From 2000 onwards, several international networks started emerging to advocate for PA promotion and support leadership for national and international reduction of physical inactivity. Some established networks and/or organisations were region-specific such as: the *Asia Pacific Physical Activity Network* (APPAN), *Africa Physical Activity Network* (AFRO-PAN), *The Healthy Caribbean Coalition, Red Actividad Fisica de las Americas/Physical Activity Network of the Americas* (RAFA-PANA), and *Health-enhancing physical activity* (HEPA) *Europe.* RAFA-PANA was founded in 2000, and it is focused on the American region. Its key goal is to strengthen, integrate, and distribute experiences and policies of national networks as well as to promote the implementation of the evidence-based strategies related to PA (Red Actividad Fisica de las Americas/Physical Activity Network of the Americas, 2019). In the European region, HEPA Europe is the most prominent network for PA promotion. Some of its objectives relate to contributing to the development of inter-sectoral and multi-sectoral policies and strategies and to supporting actions for the development of supportive policy, social, and physical environments for PA promotion (World Health Organization, Regional Office for Europe, 2019).

On the global level, the *Global Advocacy for Physical Activity* (GAPA) is an advocacy council of the *International Society for Physical Activity and Health* (ISPAH). It was established in 2007. One of the GAPA's strategies is to advocate for the implementation, dissemination, and development of national PA policies, guidelines, and action plans (Global Advocacy for Physical Activity, 2018). Furthermore, *Global Observatory for Physical Activity* (GoPA!) is also an ISPAH council that was founded in 2012, as the one of the first global attempts to standardise information on policy, surveillance, and research related to PA (Ramirez Varela et al., 2018b). It was created as a response to a global pandemic of insufficient PA (Ramirez Varela et al., 2018b). The GoPA! is responsible for developing standardised country-specific PA profiles, so-called "Country Cards" (Ramirez Varela et al., 2017). One global network specifically focused on PA for children and youth is *Active Healthy Kids Global Alliance*. It was founded in 2014 and it publishes *Active Healthy Kids Report Cards on Physical Activity for Children and Youth.* The "Report Cards" contain several indicators and one is dedicated to policy and government's initiatives (Active Healthy Kids, 2019). As presented, all networks recognise the importance of policy dissemination, policy implementation, policy making, and policy-advocacy in PA

promotion. Some of the key goals of PA policies are to encourage and/or guide the development of programs, campaigns, interventions, and social and physical environments that support people to engage in physically active lifestyles (Bellew, Bauman, Martin, Bull, & Matsudo, 2011; World Health Organization, 2017a).

SB research is a relatively young research field of behavioural epidemiology which has experienced prominent growth in the last decade (Tremblay et al., 2017). Research shows that an average adult spends more than half a day in SB, which has become a serious medical and public health problem (Leitzmann, Jochem, & Schmid, 2018). Even though the research and evidence-base on the measurement techniques, trends, prevalence, determinants, correlates, interventions, and health effects and outcomes of SB is rapidly growing, the research around SB policies seems to be limited. Only recently, in 2018, one of the first attempts to summarise key information and general findings regarding SB policies was provided in the book *Sedentary Behaviour Epidemiology* (Leitzmann et al., 2018). Chapter 25 is dedicated to SB policies, and it provides valuable information regarding SB policy research (Okely, Tremblay, Hammersley, & Aubert, 2018). The chapter is focused on policies in several settings – home, workplace, health care, leisure, education, and transportation. Government and non-government guidelines and recommendations mentioning SB are targeted as a "key policy component" (Okely et al., 2018, p. 565). The chapter also provides a summary of SB policies from around the world from government and non-government organisations on a national and international level. The summary includes six countries from four different regions namely Australia, New Zealand, Canada, the United States of America (USA), Korea, Qatar, 12 European countries, and a few worldwide initiatives from international networks and/or organisations. The contribution of this book chapter is valuable for the novel research field related to SB policies.

Unlike relatively common studies that analyse national-level PA polices, it is rare to find studies that analyse SB policies independently of PA policies (Coenen et al., 2017). Furthermore, unlike in case of PA, there are only a few international networks that specifically focus on SB, one of which is the *Sedentary Behaviour Research Network* (SBRN). The SBRN aims to connect SB researchers and health professionals (Sedentary Behaviour Research Network, 2019). Its primary focus is research-orientated and it does not have a policy-related component embedded in its mission or

objectives. Similar to the goals of PA policies, it can be claimed that the main goals of SB policies may be related to the creation of interventions, programs, campaigns, and physical and social environments that support all target groups and especially priority populations such as children and older adults in reducing and/or minimising their sedentary time. National PA and SB policies can be separate or interconnected. They can, therefore, be considered independently or within the same analysis, depending on the research question and underlying theoretical framework. For example, the Viable Integrative Research in Time-Use Epidemiology (VIRTUE) framework highlights the importance of analysing policies issued to support the promotion of healthy time-use (e.g. 24-movement guidelines incorporating recommendations on PA, SB, and sleep) policies issued to support the promotion of healthy time-use (e.g. 24-movement guidelines incorporating recommendations on PA, SB, and sleep; Pedišić, Dumuid, & Olds, 2017).

National policies often provide an essential starting point for formulating and implementing effective policies at other levels. Without proper development and implementation of national-level PA and SB policies, policies on lower levels such as local and institutional levels (which are usually focused on various settings such as school, childcare, and workplace) may lack guidance and support. Furthermore, the development of national policies on PA and SB could: (i) provide coherence, visibility, and support at the political level; (ii) lead to a greater allocation of resources (Daugbjerg et al., 2009) for the promotion of more PA and less SB; and (iii) lead to an increase in population PA levels and a reduction of SB. Therefore, continuous efforts are needed in the space of PA and SB policy research to support the development of new PA and SB policies or to encourage the improvement, implementation, and evaluation of existing PA and SB policies (Kohl et al., 2012; Schmid, Pratt, & Witmer, 2006; Rütten et al., 2016).

Policy analysis is a powerful tool that can contribute to the promotion of more PA and less SB in the population. Analysing policies and understanding their effects and impact may be crucial for achieving lasting reforms within the health promotion sector (Walt, 1996; Walt & Gilson, 1994). Policy analysis of national PA and SB policies may contribute to: (i) awareness-raising related to existing gaps, challenges, and prospects; (ii) encouraging important debates across governmental, non-governmental, and

research sectors to address the raising concerns regarding SB and physical inactivity; and (iii) supporting policy and decision makers to make better informed decisions and take bold actions to tackle political, social, and environmental issues related to population based insufficient PA levels (Buse et al., 2009; Quade et al., 1989; Buse, Mays, & Walt, 2005; Bull et al., 2014b; Althaus, Bridgman, & Davis, 2013).

2.2. PA and SB policy analysis – gaps and challenges

In the last two decades, many countries have made an effort to develop national policies related to PA (Bull et al., 2004a), which has been accompanied by stronger research focus on the analysis of PA policies. Two significant gaps were found in the literature around PA and SB policy research. As shown in the previous part, research around PA policies is underdeveloped compared to other types of PA-related research, which is even more true for SB policy research. Moreover, the next part will show how the development of PA policy research has especially progressed in high-income countries, leaving PA and SB research in low- and middle-income countries relatively underdeveloped.

Regarding the first gap, a structured literature review that mapped the chronological development of health and PA research area identified twenty-three publications in the policy and practice field (Ramirez Varela et al., 2018a). The authors concluded that this low density of policy publications suggests that there is a gap in the field, and advancing work on PA policy research is critical (Ramirez Varela et al., 2018a). A similar idea about public health policy related to PA being underdeveloped and "poorly defined" was presented more than a decade before this structured review (Ramirez Varela et al., 2018a) in an article by Schmid and colleagues (2006). They concluded that the research related to the environmental interventions to promote PA is constantly evolving and growing, unlike PA policy research (Schmid et al., 2006). In 2014, Bull and colleagues stated that "to date, few articles on physical activity policy analysis have been published" (2014a, p. 234). In 2016, Rütten and colleagues conducted a comparative scoping review to identify scientific evidence that informs PA policy. They divided the evidence into three major types. The first type of evidence is linking PA to risk factors and health outcomes. The second type of evidence is the evidence that connects interventions to PA behaviour. The third type is the so-called policy-making evidence. The third type of research, which links PA policy making and policy processes to PA interventions, is the least developed (Rütten et al., 2016). The authors conclude that their findings "mirror the conclusion" from an earlier literature review (Breton & De Leeuw, 2010) "that policy research in health promotion is still in its infancy" (Rütten et al., 2016, p. 559). No similar review was found to be available to determine the stage of development of the SB policy research field.

In 2004, one of the first comparative international PA policy reviews that included six high-income countries and one middle-income country was published (Bull et al., 2004a). In that study, PA policy was analysed based on eleven criteria for "successful policy and action plans on physical activity" (Bull et al., 2004a, p. 95). The study identified key issues related to PA policy in all included countries, but only Australia's efforts to develop PA policy were thoroughly elaborated (Bull et al., 2004a). The study was accompanied by an extensive technical report which provided an in-depth analysis of policies related to PA in Brazil, Canada, the Netherlands, New Zealand, Scotland, and Switzerland (Schöppe, Bauman, & Bull, 2004). A few years later, further development of the Australian PA policy was the focus of another policy review by the same group of authors (Bellew, Schöeppe, Bull, & Bauman, 2008). Australian PA policies from 1996 to 2006 were analysed and compared with policies in Brazil, Canada, Finland, the Netherlands, New Zealand, Scotland, and Switzerland (Bellew et al., 2008).

Further significant contributions to the development of PA policy analysis were made by Daugbjerg and colleagues (2009) and Christiansen, Kahlmeier, and Racioppi, (2014). In a content analysis of 27 national policy documents from fourteen countries of the WHO European region, the authors outlined eight aspects relevant for effective PA policies (Daugbjerg et al., 2009). Even though the research aimed to cover the whole WHO European region, the language barrier restricted the inclusion of all countries in the analysis (Daugbjerg et al., 2009). The analysis showed that only a few policies contained quantified goals for PA and only around 50% of policies indicated an intention or requirement related to policy evaluation (Daugbjerg et al., 2009). A study conducted by Christiansen and colleagues (2014) focused solely on the European Union (EU) and the analysis included 25 policies from 15 EU member states. The authors used twelve categories for the development of the content analysis grid. The analysis showed many policies lacked specified budgets, specific policy evaluation plans, and measurable targets (Christiansen et al., 2014).

As stated, one of the most significant gaps in PA policy research is the fact that high-income countries have been significantly better represented within PA policy research than low- and middle-income countries. For example, several publications analysed PA policies in EU member states, often as a result of multi-country projects funded by the

EU and/or the WHO Regional Office for Europe (Aro et al., 2016; Hämäläinen et al., 2015; Hämäläinen et al., 2016a; Hämäläinen, Sandu, Syed, & Jakobsen, 2016b; Rütten et al., 2012; Rütten et al., 2013; World Health Organization, 2011). This makes EU member states much better covered by PA policy research than other countries of the WHO European region. Outside of Europe, high-income countries such as Canada and the USA, have large research networks in charge of identifying PA and SB policies and analysing their determinants, outcomes, and impacts (Eyler, 2011; Manteiga et al., 2017; Pollack, Schmid, Wilson, & Schulman, 2016; Colley, Brownrigg, & Tremblay, 2012). However, for other countries, especially low- and middle-income ones, the publicly available information about the availability of PA and SB polices seems to be limited.

Lachat and colleagues (2013) conducted a systematic review of policies related to PA and diet in low- and middle-income countries. The study reviewed the availability and content of governmental health, NCD, or nutrition policies from 83 WHO member states (Lachat et al., 2013). The study analysed availability and partially the content of governmental policy documents published until 1st January 2013 (Lachat et al., 2013). The study is a major contribution to NCD policy research in low- and middle-income countries, but its effect on PA policy research is limited as it presents findings related to PA policies only for 35 countries (Lachat et al., 2013). This significant gap in PA policy research related to PA policies in low and middle-income countries was also acknowledged in a structured literature review by Ramirez Varela and colleagues (2018a).

One study that analysed SB policies independently of policies related to PA, was published in 2017 (Coenen et al.). This qualitative review analysed 119 international and national policies related to SB (Coenen et al., 2017). The analysed policies were exclusively from the following high-income countries: Australia, Canada, Denmark, Finland, the Netherlands, New Zealand, the USA, the UK, and Sweden (Coenen et al., 2017).

To address both gaps mentioned in this part – one related to the statements around PA (and SB) policy research as an underdeveloped field and another which identifies PA policy research as significantly poorer in low- and middle-income countries – it is

necessary to comprehensively review the current state of the evidence within the field of PA and SB policy research and its actual level of development internationally.

No systematic and/or scoping review including both academic and grey literature was found to provide answers to important research questions such as: "To what extent have policies related to PA and/or SB been researched?" and "In which countries were PA and/or SB policies analysed and what were the main findings regarding their PA and/or SB policies?". Study 1 (Chapter 4) aims to address this gap. Study 4 (Chapter 7) aims to address research gaps related to the lack of available PA and SB policy research in low- and middle-income countries.

2.3. Instruments for PA and SB policy research – gaps and challenges

In the field of political science, no scientific consensus is available on how to perform policy analysis and which method, technique, instrument or tool is best (Hird, 2017; Dunn, 2004; Kustec-Lipicer, 2012; Fischer, Miller, & Sidney, 2007). This is one of the key reasons why standardisation in policy research may be difficult to achieve. Plenty of tools, methods, techniques, and instruments are available for: wide-ranging policy analysis (Dunn, 2004; Bardach & Patashnik, 2015; Colebatch, 2005; Friedman, 2017; Geva-May, 1997); health policy analysis (Walt et al., 1994; Collins, 2005; Walt et al., 2008; Araújo & Maciel Filho, 2001; Kingdon, 1995); and specific areas within health policy, for example obesity policies (Sacks, Swinburn, & Lawrence, 2009) or chronic illness (Cheung, Mirzaei, & Leeder, 2010). Due to the multi-sectoral and cross-sectoral nature of PA policies, an instrument for PA policy analysis may: (i) be specifically designed to solely audit/assess PA policies (Bellew et al., 2008; Shephard et al., 2004; Bull, Milton, & Kahlmeier, 2011); (ii) be designed to audit/assess PA policies and other related policies such as obesity or sport policies (Christiansen et al., 2014; Branca, Nikogosian, & Lobstein, 2007); or (iii) be of a more general nature, designed to audit/assess policies related to different health promotion areas such as the *Analysis of Determinants of Policy Impact* (ADEPT) model, which can be used for four health promotion areas: promotion of PA, early detection of breast cancer, creation of supportive environments, and prevention of smoking (Rütten, Gelius, & Abu-Omar,

2010). The following part aims to present an overview and an assessment of the existing instruments for PA policy analysis focusing on their strengths and weaknesses.

2.3.1. Historical overview and assessment of the instruments for PA policy analysis

The first instrument that was developed to guide PA policy analysis is the *Comprehensive Physical Activity Policy Framework* (Shephard et al., 2004). It was developed during the WHO/Centres for Disease Control and Prevention (CDC) consultation process in 2002. One of the three key goals of the consultations was to make recommendations for establishing policies to increase population-level participation in PA at an international level as well as supporting and promoting national PA plans and strategies (Shephard et al., 2004). Along with the WHO/CDC representatives, participants from 16 countries from various governmental and privately financed agencies for health promotion, universities, and industry attended the meeting (Shephard et al., 2004). The participants developed a PA policy framework that contains six-stages and more than 30 guiding principles for a comprehensive national PA policy (Shephard et al., 2004). The first stage is focused on setting an overall vision for a PA policy. It is proposed that the vision must be "sustainable, credible, innovative, adaptable, equitable, socially just, and linked with appropriate data" (Shephard et al., 2004, p. 347). The second stage is focused on "making the case" for early action related to physical inactivity (Shephard et al., 2004, p. 347). The third stage is dedicated to defining the problem through addressing the target populations, prevalence and determinants of physical inactivity, and obstacles to policy and practice (Shephard et al., 2004). Stage four involves developing a menu of potential solutions, taking into consideration several important factors such as the use of multiple settings, cultural specificity, and good governance (Shephard et al., 2004). The fifth stage deals with the implementation process and provides nine bullet points outlining elements of successful existing programs. The stage six shortly mentions the importance of evaluation and the feedback process (Shephard et al., 2004). This framework may be a valuable starting point for PA policy development and analysis. However, one major concern is that the first and the last stages are, unlike all other stages, very sparse, ambiguous, and unelaborated. For example, in the first stage none of the mentioned values are further explained, allowing for their possible misinterpretations. Also, the

sixth stage mentions that evaluation and feedback need to be performed using "specific indicators" without stating what these specific indicators might be (Shephard et al., 2004, p. 349). It seems that the framework has never been used in an actual PA policy analysis of a specific country. However, it was utilised to guide the development of the most likely first instrument (Bull et al., 2004a) used for a national PA policy analysis.

Shephard and colleagues' framework was utilised in the development of the already mentioned eleven "criteria for successful policy and action plans" on PA (Bull et al., 2004a). These eleven criteria were established in 2004 and comprise of: consultation with major stakeholders in the policy development phase; comprehensive approach using multiple strategies; working at various levels; working through partnerships, coalitions, and alliances; sustainable resources and stable base of support; identity development; timeframe; health surveillance/monitoring system that includes measures of PA/physical inactivity; evaluation; integration of PA policy with other related agendas; and acknowledgement of existing national PA guidelines or an intention to develop them (Bull et al., 2004a). This seems to be one of the first instruments used to analyse national PA policies in specific countries around the world (Bull et al., 2004a; Bull, Bauman, Bellew, & Brown, 2004b).

In 2008, the same group of authors refined their 11 criteria and developed the so-called HARDWIRED criteria (Bellew et al., 2008). The acronym stands for nine criteria: "Highly consultative in development; Active through multi-strategic, multi-level, partnerships; Resourced adequately; Developed in stand-alone and synergistic policy modes; Widely communicated; Independently evaluated; Role-clarified and performance-delineated; Evidence-informed and Evidence-generating; and Defined national guidelines for health enhancing physical activity" (Bellew et al., 2008). This instrument, also developed as a set of criteria, may be employed for reviewing successful national PA policy. The HARDWIRED set of criteria was used to analyse policies in one upper middle-income country and six high-income countries (Bellew et al., 2008). After its development, the instrument was found to be employed in two other studies that analysed Canada's PA policies (Craig, 2011; Active Healthy Kids Canada, 2010).

Up until 2010, instruments for PA policy analysis were mainly structured as sets of several criteria. These types of instruments did not go through a validation process or follow a rigorous development procedure. Their development process was not based on a specific theoretical or conceptual framework and they are mainly 'consensus principles' established within a group of experts. In 2010, Rütten and colleagues developed the ADEPT model, which "aims to bridge the gaps" between research, practice, and theory in health promotion (Rütten et al., 2010). This seems to be one of the first instruments used for PA policy analysis, structured as a measurement tool, that contains specific questions for researching PA policies. The model is an adaptation of von Wright's individualistic action theory to health policy analysis (Rütten et al., 2010). It is based on a "broader definition of policy" (Rütten et al., 2010). Such definition includes informal institutional procedures and arrangements together with rationales for action on health-related matters (Rütten et al., 2010). The model was operationalised into a 35-item quantitative questionnaire using a five-point Likert response scale and empirically tested (Rütten et al., 2010). It was further subjected to Cronbach alpha analysis which resulted in a final 20-item questionnaire (Rütten et al., 2010). It was used to assess policies in four sectors of health promotion: smoking prevention; PA promotion; early detection of breast cancer; and creation of supportive environments (Rütten et al., 2010). The shorter 14-item version of the original questionnaire was developed "based on results of dimension reduction analysis" (Rütten et al., 2012). This 14-item tool was used in a study that assessed policies in the area of PA promotion among older adults in 15 European countries (Rütten et al., 2012). The instrument contains four categories namely goals, obligations, resources, and opportunities. Compared to previous instruments for PA policy analysis this instrument's two major advantages are that it is: (i) theory-driven; and (ii) based on a model that has been empirically tested. This instrument is particularly suitable for researchers who would like to conduct interviews with decision makers. However, the instrument does not have an explicit focus on PA policies because it may be used for other areas of health promotion. Also, it does not address SB policies and it employs a broad definition of *policy*. This might not be convenient for researchers who wish to analyse SB policies and employ a narrower definition of policy.

A major step towards support of standardised auditing of national policy approaches to PA, was made by the HEPA Europe expert group. In 2011, they developed a first

version of a comprehensive instrument for PA policy audit called the *Health Enhancing Physical Activity Policy Audit Tool* (HEPA PAT). Before the development of HEPA PAT, there was no "standardized instrument to capture the relevant policy information in a standardized way or to collate more in-depth data" (Bull et al., 2014a, p. 243). HEPA PAT is structured around the WHO's 17 key elements for a successful national approach to PA promotion. The first version of the HEPA PAT is, besides in English, also available in French and Arabic (World Health Organization, 2014a), which makes it possibly the only instrument for PA policy analysis available in multiple languages. The second version of the HEPA PAT seems to be the first instrument that mentions SB not only as a part of monitoring/surveillance, but also as a part of national policy approaches (Bull, Milton, & Kahlmeier, 2015). It is structured as a measurement tool, an extensive, 20 pages long questionnaire that contains 27 items. The tool encompasses both open and close-ended questions. Several studies utilised HEPA PAT to audit national PA policies (World Health Organization, 2014a; Bull et al., 2014c; Prévot-Ledrich, Van Hoye, Lombrail, Lecomte, & Vuillemin, 2016). This instrument's key advantages are: (i) it was developed using an extensive validation process; (ii) the experts included in its development represent different countries with different history in PA promotion and with various stages of PA policy implementation and development; (iii) it includes SB policy; and (iv) it was used/tested in seven European (Bull et al., 2014c; Bull et al., 2014d) and ten Eastern Mediterranean countries (World Health Organization, 2014a). Nevertheless, three to six months are needed to complete the whole process, and the primary purpose of HEPA PAT is limited to policy audit (Bull et al., 2015). Therefore, the instrument cannot be used for an actual assessment or rating. Bull and colleagues suggested that the next task for the research field would be "to develop a tool which allows an actual assessment or rating of the progress and success of national HEPA related policies" (2014, pp. 239-240).

No study or systematic review was found that reports on all existing instruments used for analysis of policy related to PA and/or to SB. Such study would be useful to provide a comprehensive "menu" of instruments for academics, public officials, health policy practitioners and specialists, and policy makers interested in analysing and monitoring PA and SB policies. Study 3 aims to address this gap (Chapter 6).

2.4. Theoretical/conceptual frameworks related to PA policy research – gaps and challenges

The first, and so far only conceptual framework related to PA policy research was developed in 2006 - *A Conceptual Framework for Public Policy Relevant to Physical Activity* (Schmid et al., 2006). A review of relevant literature, workshops, collaborative discussions, and a review of other frameworks for policy research informed the development of this framework (Schmid et al., 2006). At that time, PA policy research was in its early phase. Since then, a significant progress seems to have been achieved in the development of PA policy research (Ramirez Varela et al., 2018a). Schmid and colleagues' conceptual framework was mentioned in several studies analysing national PA polices (Bellew et al., 2011; Daugbjerg et al., 2009; Christiansen et al., 2014; Rütten et al., 2013; Eyler, 2011; Woods & Mutrie, 2012; Wu, 2015; Pratt et al., 2016), but only a small number of studies relied on this framework to guide a PA policy analysis of a specific country (Daugbjerg et al., 2009; Christiansen et al., 2014). It seems that very few studies focused on analysing indicators, development, and content of national-level PA and SB policies relied on conceptual or theoretical frameworks. The fact that most previous studies on PA and SB policies did not rely on a theoretical/conceptual framework, may have led, in some cases, to vague conceptualisations of the research questions. Furthermore, only one instrument for PA policy analysis was developed based on a theoretical framework (Rütten et al., 2012). Using methods, theories, models, concepts, and frameworks from older disciplines such as political science may positively contribute to further development of PA and SB policy research. In their comparative scoping review, Rütten and colleagues concluded that in the area of PA research, an emphasis needs to be put on "integrating stronger theoretical foundations and improving policy-process research methodology" (2016, p. 559). Study 2 (Chapter 5) aims to address this gap.

2.5. Standardisation of PA policy research – gaps and challenges

Standardisation within a research filed can strongly contribute to comparability of research findings. One of the first major global attempts to accumulate, compile, and standardise data and information related to PA surveillance, research, and policy is reflected in the GoPA!'s Country Cards (Ramirez Varela et al., 2017). The standardised country-specific profiles contain indicators related to each country's demographics, PA

prevalence, surveillance system, and policy (Ramirez Varela et al., 2017). In the part which is dedicated to PA policy, it was reported that around 76% out of 139 analysed countries have a national PA policy either as a standalone policy (26.6%) or as a national NCD policy that includes PA (46.9%) (Ramirez Varela et al., 2017). The data were reported to be compatible with the WHO data from the 2013 report *Assessing national capacity for the prevention and control of NCDs* (World Health Organization, 2014b). The WHO report found that 80% of the WHO member states had a policy, plan, or strategy addressing physical inactivity (Ramirez Varela et al., 2017; World Health Organization, 2014b).

Since 2000, the WHO has been conducting surveys to assess each member state's "national capacity for the prevention and control of NCDs" (Alwan, Maclean, & Mandil, 2001). Data collected by the WHO in 2004 showed that: (i) 23% of the WHO member states had a national act, law, or legislation related to PA; (ii) 29% had a specific national policy related to PA; and (iii) 32% had a specific national action plan (World Health Organization, 2007a). In the subsequent survey conducted in 2010, the "percentage of countries with a policy, plan, or strategy" addressing physical inactivity significantly increased (World Health Organization). Seventy-three percent of the WHO member states reported having a policy, a plan, and/or a strategy (World Health Organization, 2012). However, only 53% of policies, plans, or strategies were operational and 40% were operational with dedicated funding (World Health Organization, 2012). As mentioned above, in the data collection from 2013, 80% of countries reported having a policy, a plan, or a strategy addressing physical inactivity and 56% were operational (World Health Organization, 2014b). The reports that informed about the data collected in 2015 and 2017 stated that 91% (2015) and 90% (2017) of countries had a policy/plan/strategy addressing physical inactivity and 70% (2015) and 77% (2017) were operational (World Health Organization, 2016, 2018c). In all WHO reports, the percentages were continuously much higher in high-income countries than in middle- and low-income countries. Figure 1 was developed based on the data related to physical inactivity policies presented in four reports issued by the WHO.

Figure 1. Percentage of countries with a policy, strategy or action plan related to physical activity*

*Data taken from the WHO's reports for *Assessing national capacity for the prevention and control of NCDs* (2010 – 2017).

Even though the data obtained through GoPA! Country Cards seem to be "in agreement with the estimate" of the WHO's report from 2013 (Ramirez Varela et al., 2017, p. 703), the data collection process was based on different questionnaires and different definitions of policies. Therefore, anticipatory conclusions on the compatibility of data may contain a methodological flaw. First of all, while GoPA's questionnaire asks about a standalone national or sub-national PA plan which is sometimes also referred as a PA policy, the WHO's questionnaire made a distinction between a policy, a plan, and a strategy and asked whether there is "a policy, strategy, or action plan for reducing physical inactivity and/or promoting PA" (World Health Organization, 2014b, 2012, 2016). Secondly, due to the fact that the GoPA! Country Cards are focused only on PA, it is possible to obtain a country-specific data regarding PA policies for each of the analysed countries (Ramirez Varela, Pratt, Borges, & Hallal, 2016). On the other hand, the WHO's reports are focused on NCDs and they are reporting on PA solely as one of the risk factors for NCDs. The data in the WHO's reports are not country-specific but are grouped according to the regions and/or income of analysed countries (World Health Organization, 2014b, 2012, 2016, 2018c). Therefore, if a researcher wanted to conduct a comprehensive comparison of data collected by the GoPA! and the WHO, it would not be possible to compare the country-specific data. Researches from both the GoPA! and the WHO contain valuable data regarding PA policies around the world,

but the comparability of their findings is limited due to the lack of a standardised instrument used to collect the data.

Another major international initiative for standardisation in PA and SB research area is the *Active Healthy Kids* (AHK) *Global Alliance*. Since 2014, the AHK Global Alliance has published country- specific report cards on PA for children and youth. In 2018, the Alliance published the *Global Matrix 3.0* which includes results and analysis from the report cards on PA in children and youth for 49 countries around the world (Aubert et al., 2018). The report cards contain ten indicators related to PA in children and youth. Each indicator is graded by the country's report card working group, which is composed of national PA experts and stakeholders. The working group grades the indicators based on the predetermined benchmarks (Aubert et al., 2018). The last indicator is related to national PA policies. The *Government* indicator has three benchmarks: "Evidence of leadership and commitment in providing physical activity opportunities for all children and youth; Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth; Demonstrated progress through the key stages of public policy making (ie, policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future)" (Aubert et al., 2018, p. S254). Some of the report cards working groups have reported that this indicator is especially difficult to grade (Tremblay et al., 2014; Tremblay et al., 2016). In the *Global Matrix 3.0*, eight countries did not grade this indicator (Aubert et al., 2018). As noted by the authors of the *Global Matrix 3.0,* since there is no official standardised method to evaluate Government's influence on children and youth's PA levels, the grades for this indicator were informed by various types of data using various methods (Aubert et al., 2018). Therefore, their findings are difficult to interpret and compare.

Besides the aforementioned efforts in the standardisation of PA research, a significant effort to standardise the data collection processes regarding PA policies was conducted by the HEPA Europe expert group which developed the HEPA PAT instrument (Bull et al., 2015). However, two main limitations may hinder the possibility of the tool to become an instrument utilised on a global level for a PA policy analysis. First of all, the tool is intended to be used for PA policy audit, so its use for policy assessment and analysis is limited. Secondly, the tools great advantage – comprehensiveness – is at the same time its greatest limitation to becoming a globally used tool. Many low- and

middle-income countries around the world may not have the personnel and resources to completely utilise the tool because its full completion has been reported, among researchers, to take up to a year. Therefore, further efforts are needed towards the international standardisation of PA/SB policy research.

Study 4 (Chapter 7) aims to address this gap with the development of a new instrument for PA and SB policy audit and assessment, the *GoPA! Policy Inventory 3.0*.

2.6. Towards a standardised international audit and assessment of PA/SB policies

As emphasized throughout this chapter, several significant gaps are present in the PA and SB policy research field. First of all, advancements in the PA policy research field are necessary as it is less developed compared to other fields of PA research (Ramirez Varela et al., 2018a). Second, even though there are several studies which have investigated policies and policy documents related to PA (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; Christiansen et al., 2014), very few studies also analysed SB-related policies and only one study seems to have analysed SB policies independently of PA policies (Coenen et al., 2017). Third, the majority of the studies are generally focused on high-income countries, with very few studies analysing PA and SB policies in low- and middle-income countries (Lachat et al., 2013; Manyanga et al., 2016a). Fourth, a variety of different instruments for PA policy analysis and methods have been used across studies as well as different conceptualisations and definitions of policies, which significantly limits comparability of their findings (Houlihan, 2002; Bergsgard, Houlihan, Mangset, Nødland, & Rommetvedt, 2007). Fifth, there seems to be no standardised instrument that: (i) is based on a conceptual or theoretical framework; (ii) allows for both audit and assessment of PA and SB policies; and (iii) is comprehensive but also simple enough to be used on a large international scale. Sixth, Bellew et al. (2008) reported that none of the countries they researched (out of which several are considered as global leaders in PA promotion) established a systematic approach for evaluating the PA policy implementation. Other research has also shown that countries recognise the need to evaluate PA policy but provide limited evidence on implementation and evaluation (Bull et al., 2014b). It has also been suggested that countries have made insufficient progress on PA policy implementation

(Sallis et al., 2016). It is, therefore, important to develop a greater understanding of the "implementation and evaluation gap" (Cairney, 2012). Study 4 (Chapter 7) aims to address this gap providing an analysis of availability, comprehensiveness, implementation, and effectiveness or PA and SB policies in various high-income, middle-income, and low-income countries.

3. Methodology

This chapter provides a general overview of the research design and methodology used in this thesis. It is divided into four main parts. The first part is focused on the research design employed in the thesis. The second part explains the *Ecological model of four domains of active living* (Sallis, Owen, & Fisher, 2008) and *Ecological Systems Theory* (Bronfenbrenner, 1977). *Ecological model of four domains of active living* is employed as an overarching conceptual framework of the thesis. *Ecological Systems Theory* is employed as an overarching theory of the thesis. The third part is focused on the theories and frameworks that underpinned the development of the CAPPA framework. The CAPPA framework is employed as a dominant conceptual framework in Study 3 (Chapter 6) and Study 4 (Chapter 7). The fourth part is dedicated to specific methods employed in each of the studies: (i) a systematic literature review that was employed in Study 1 (Chapter 4) and Study 3 (Chapter 6); (ii) the Delphi method that was used in the development of the CAPPA framework (Study 2, Chapter 5); and (iii) the survey method that was employed in Study 4 (Chapter 7). In addition to the methodological and conceptual overview presented in this chapter, each specific chapter also contains a separate "methods section" embedded within a standalone manuscript/study.

3.1. Research design

This PhD thesis employed a sequential approach. The findings of each study inform the development of the following study. An overview of included studies and their respective publications, along with the research aim, methods, and key findings is available in Chapter 8, Table 8. The table also provides an explanation of how findings from one study informed the following study and/or other studies. The thesis includes four studies: two systematic literature reviews presented in Chapter 4 (Study 1) and Chapter 6 (Study 3); one qualitative study presented in Chapter 5 (Study 2); and one cross-sectional quantitative study available in Chapter 7 (Study 4).

Ethics approval for conducting Study 4 was granted in June 2019 by Victoria University Human Research Ethics Committee (ref: HRE19-057). Information for participants involved in the study and Consent form for participants involved in research are available in Appendix E.

Categorisation of countries

The World Bank's list 218 economies from June 2019 was employed as an inventory of countries/states/economies (World Bank, 2019). Certain countries/states/economies on the list cannot be labelled as "countries" because of unclear political and/or legal status. Nonetheless, for brevity purposes, the term "countries" has been employed as an abbreviation for "countries/states/economies". In order to be consistent with former analyses of national-level PA and SB policies by the GoPA! (Ramirez Varela et al., 2016) and other international organisations for PA promotion (Tremblay et al., 2014; Tremblay et al., 2016), four UK home nations, i.e., England, Northern Ireland, Scotland, and Wales, were analysed separately. The countries were additionally categorised by economic standard and world region, which is additionally elaborated in the methods sections of Study 1 and Study 4.

3.2. Ecological model

In the PA field, many prevalent theories and frameworks such as social cognitive theory and health belief model have an individualist focus (Rhodes, McEwan, & Rebar, 2018). This focus leaves a gap for a broader understanding of individuals' health behaviours through policy and the environment (Sallis et al., 2008; Rhodes et al., 2018). The gap was filled with social-ecological models often also called 'socioecological' or only 'ecological' models. In the last thirty years, a significant increase in interest and application of (social) ecological models has been visible in the area of public health and health promotion (Sallis et al., 2008; Rhodes et al., 2018). The models have shown to be promising frameworks to guide comprehensive, population-based approaches that contribute to behaviour change (Sallis et al., 2008). The core principle behind the models, regardless of their differences, is that multiple levels can influence people's health-related behaviour: intrapersonal (biological, psychological); interpersonal (cultural, social); organisational (school, workplaces); physical environment (natural, built); and policy (rules, codes, laws, regulations) (Sallis et al., 2008). Ecological models are considered to be the most successful and efficient when they are "tailored to specific health behaviour", mainly because both policy variables and environmental variables are behaviour specific (Sallis et al., 2008, p. 466). Therefore, in the case of PA and SB, a set of different individual, social, environmental, and policy factors can influence behaviour change to increase the level of PA and reduce SB at both individual and population levels. In other words, interventions that aim to increase population PA and/or reduce population SB levels will be the most effective if they consider all relevant variables/levels of the ecological model. The social-ecological model is now a dominant model in the PA field (Rhodes et al., 2017).

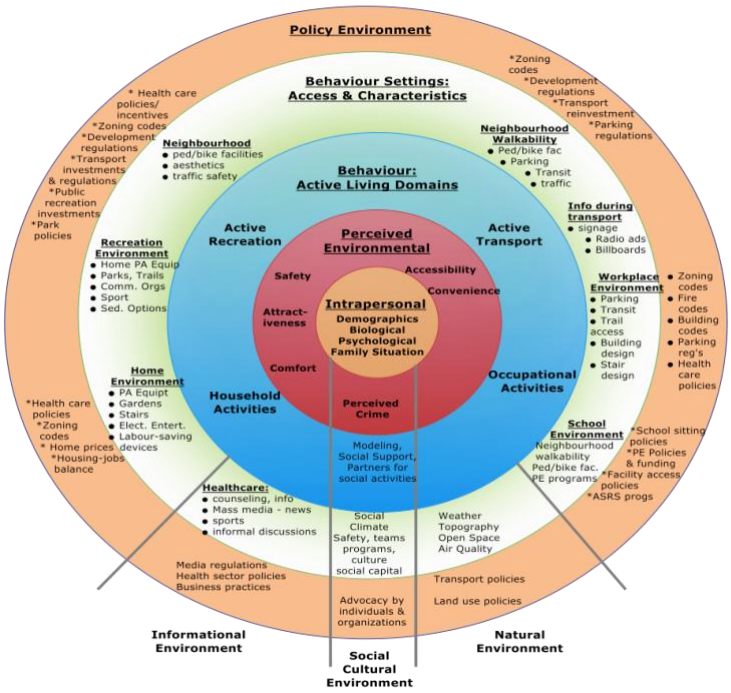
There are several key advantages of using the ecological model as a dominant framework compared to other theories, models and/or frameworks. PA studies that rely on social-ecological models have provided strong evidence that PA has many levels of possible influence, which is a key idea behind the social-ecological framework (Rhodes et al., 2018). Also, the ecological model applied in the PA area provides a broader understanding of PA which can be performed in four domains, which is a significant advancement compared to other frameworks and theories that often narrowed PA to

either exercise or sport (Rhodes et al., 2018). Finally, ecological models provide a new conceptual platform that moves away from an 'old view' of blaming individuals for their own health behaviour. They put an emphasis on various actors in society who share the responsibility for the overall health status of a population. In other words, the models contributed to displacing focus from a purely individual responsibility – "Each person is responsible for their health-related behaviour" – towards a more holistic view of various factors and levels that may influence individual and population health outcomes. Putting a stronger focus on the policy and environmental levels that also contribute to behaviour change may serve as a good starting point for national governments to enhance their efforts on improving population health outcomes (Rhodes et al., 2018).

In 2006, a group of authors synthetised concepts and findings from several fields: city planning and transportation, health, public policy, economics, and leisure sciences and developed a comprehensive and PA-specific ecological model – *Ecological Model of Four Domains of Active Living* (Sallis et al., 2006; Sallis et al., 2008). The model is presented in Figure 2 and has five layers: (i) *intrapersonal*; (ii) *perceived environment*; (iii) *behaviour: active living domains*; (iv) *behaviour settings: access and characteristics*; and (v) *policy environment* (Sallis et al., 2006; Sallis et al., 2008). Besides the layers, it has three key features. First of all, it is developed around four PA domains: active transport, household activities, occupational activities, and active recreation, which reflects the underlying principle that ecological models are the most useful when they are behaviour specific (Sallis et al., 2008). Moreover, some types of important influences are not necessarily tied to a certain setting in which the behaviour takes place. Finally, cultural and social environment operate at multiple levels (Sallis et al., 2008).

The *ecological model* developed by Sallis and colleagues (2006) is employed in this thesis as an overarching, umbrella framework. The specific focus of this thesis is on the last layer – the policy environment – which is determined to be a highly important determinant that can influence active living (Bellew et al., 2011; Schmid et al., 2006; Sallis et al., 2008).

Figure 2. Ecological Model of Four Domains of Active Living*



*Taken with permission from Sallis et al. (2006).

Besides the *Ecological model of four domains of active living* (Sallis et al., 2006), two frameworks that are specifically related to PA policy are also utilized in this thesis. *Physical Activity Policy Framework* was employed in Study 1 because it was the only available framework specifically tailored for PA policy research (Schmid et al., 2006). The CAPPA framework that was developed in Study 2 was employed in Study 3 and Study 4. The CAPPA framework was developed in Study 2 due to the limitations of the *Physical Activity Policy Framework* (Schmid et al., 2006).

3.3. Ecological Systems Theory

Social-ecological models have roots in *Ecological Systems Theory* developed in the 1970s by Urie Bronfenbrenner. The theory states that human development is influenced by several interconnected ecological systems: *microsystem* (interrelations between the individual and the immediate environment); *mesosystem* (connections and interrelations between key settings such as the school setting and the domestic environment); *exosystem* (indirect environment, key institutions in the society such as mass media or workplace); *macrosystem* (social and cultural environment, laws and

regulations, health, and public policy); and *chronosystems* (changes over time) (Bronfenbrenner, 1981; Eriksson, Ghazinour, & Hammarström, 2018). The theory was initially created to understand human development but was later widely applied in other research fields, including health research (Eriksson et al., 2018).

Since its initial development, the theory was revised several times. Rosa and Tudge (2013) divided the theory's revision into three key phases. In the first phase, the theory was called an "ecological model of human development" and it contained only four interconnected levels: *microsystem*, *mesosystem*, *exosystem*, and *macrosystem* (Bronfenbrenner, 1977). In the second phase, *biology* and *chronosystems* were added to the initial four-level model (Bronfenbrenner, 1981; Bronfenbrenner & Ceci, 1994). In the final phase, Bronfenbrenner and colleagues developed a *Process-Person-Context-Time* model to complement the earlier version of the ecological systems theory (Eriksson et al., 2018; Rosa et al., 2013).

Bronfenbrenner also proposed a reorientation of a prevalent view that connects science and public policy (Bronfenbrenner, 1981). Dominant paradigm usually emphasizes the importance of knowledge and science for public policy. Thus, the terms 'evidence-based', 'knowledge-based', 'research-based', or 'science-based' policy(making). Bronfenbrenner, on the other hand, emphasized that "basic science needs public policy even more than public policy needs basic science" and that their functional integration is crucial (1981, p. 8). This thesis is focused on one part of Bronfenbrenner's *macrosystem* - national policies and health. It builds on his idea about the interconnectedness of public policy and knowledge/science. As stated in the literature review, research related to PA policies is less developed than research areas focused on health outcomes of PA. This is even more so in regard to SB policy research. This thesis builds a further case that general PA and SB research needs to be underpinned by and interconnected with research related to PA and SB policies.

3.4. Theories and frameworks underpinning the CAPPA framework

As already stated, this thesis relies on the ecological model and ecological systems theory. However, the last two studies (Chapter 6 and Chapter 7) predominantly rely on

the CAPPA framework as the governing conceptual framework. The CAPPA framework is compatible with both the ecological model and the ecological systems theory.

Prior to the development of the CAPPA framework, there was only one framework (Schmid et al., 2006) specifically tailored for PA policy analysis. This framework was developed in 2006 when PA policy research was still in its infancy. Since then, policy research has grown as a research area (Ramirez Varela et al., 2018a). Understanding of which aspects and components need to be included in a comprehensive PA policy analysis is now more advanced. The findings from Study 1 informed the development of a new, more comprehensive framework for PA policy analysis – the CAPPA framework.

The CAPPA framework specifies six categories or building blocks and their corresponding 38 elements of a comprehensive PA policy analysis. The first building block is a "purpose of analysis" which includes two elements: *auditing* and *assessment*. The second category, called "policy level", includes five elements: *international*, *national*, *subnational*, *local*, and *institutional*. The third category is "policy sector" and includes the following eleven sectors: *health*, *sport, recreation and leisure*, *education*, *transport*, *environment*, *urban/rural planning and design*, *tourism*, *work and employment*, *public finance*, and *research*. The next category – "type of policy" – includes five possible types of policies: *formal written policies*, *unwritten formal statements*, *written standards and guidelines*, *formal procedures*, and *informal policies*. The fifth building block "stage of policy cycle" comprises eight stages: *agenda setting*, *formulation*, *endorsement/legitimisation*, *implementation*, *evaluation*, *maintenance*, *termination*, and *succession*. The last category – "scope of analysis" – includes the following seven elements: *availability*, *context*, *processes*, *actors*, *political will*, *content*, and *effects*.

The development of the first draft of the CAPPA framework was informed by an extensive discussion based on the frameworks, theoretical models, concepts, and theories available in the existing literature related to policy analysis as well as policy analysis within the PA and health field. Due to the abundant list of literature that informed the development of the CAPPA framework, it is beyond the scope of this

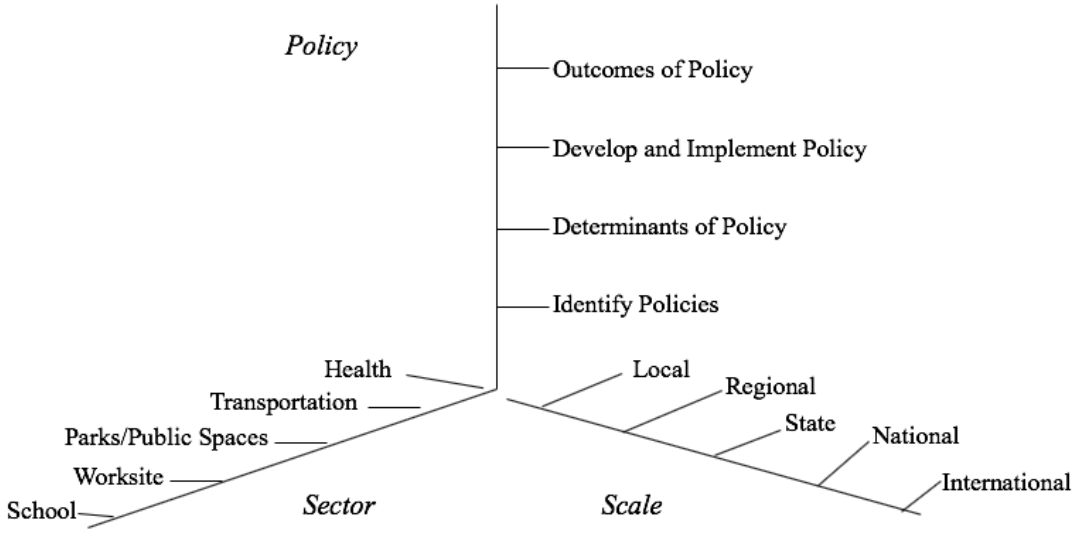
chapter to present all of them. Therefore, only two main frameworks and two main theories that informed the CAPPA framework will be presented.

The structure of the CAPPA framework is available in Figure 12. Each category and element of the framework are explained and defined in Table 2. A detailed explanation of the development of the CAPPA framework is presented in the methods section of Chapter 5.

3.4.1. Physical Activity Policy Framework

The *Physical Activity Policy Framework* (Schmid et al., 2006) was developed through: a literature review; collaborative discussions; three workshops; and a review of additional policy-related research frameworks (Schmid et al., 2006). The discussions and workshops included experts from various fields (e.g. transportation, health care, public health and PA) and key partners, such as representatives from the US National Institutes of Health and the Robert Wood Johnson Foundation. The framework was developed to improve visualisation, categorisation, and understanding of programmatic efforts and research related to PA policy (Schmid et al., 2006). The framework is based around three axes. The important aspects or components of PA policy are placed on the vertical axis: identify policies; determinants of policy; develop and implement policy; and outcomes of policy. The other two axes are the *sector* axis and the *scale* axis (Figure 3).

Figure 3. Physical Activity Policy Framework*



*Taken with permission from Schmid et al. (2006).

The *sector* axis informed the development of the CAPPA building block "policy sector" and the *scale* axis informed the development of the building block "policy level". Schmid and colleagues' conceptualisation of policy at three levels (2006) informed the development of the "type of policy" axis.

3.4.2. The Theory of Multi-Level Governance

The multi-level governance approach was developed in the early the 1990s and it originated from European studies. At first, it was applied only to the EU (Hooghe & Marks, 2011). It aimed to capture the complex process of EU governance and policy-making and explain how this unique political system, famously called "politeia sui generis" by Simon Hix, comes to its binding decisions (Piattoni, 2010). In her book *The Theory of Multi-level Governance: Conceptual, Empirical, and Normative Challenges*, Piattoni (2010) explored the multi-level approach, normative and theoretical debates, and the empirical evidence around it, and constructed the theory of multi-level governance. Nowadays, the application of the theory is broad and goes beyond the EU context (Piattoni, 2010).

Generally, the theory describes the "dispersion of power from national central government to other levels of government" including supranational and subnational institutions and also non-governmental organisations and institutions (Cairney, 2012, p. 154). It acknowledges that the political arena and policy relationships are often characterised as an unpredictable and complex system of continuous negotiations between several levels such as international and supranational, national, and subnational such as regional and local (Cairney, 2012; Piattoni, 2010; Marks, 1993).

Even though this thesis is focused solely on national-level PA and SB policies, it recognizes that multiple levels of influence also play a pivotal role when it comes to decision making process regarding PA and SB policies. The key player at the supranational/international level is the WHO. Its policies, strategies, standards, and guidelines advise and guide the member states and their national governments to develop and implement PA and SB policies. Another major supranational entity in the European context is the EU. For example, in 2013, the Council of the EU adopted the *Recommendation on promoting HEPA across sectors* and encouraged the EU member states to incorporate a cross-sectoral approach in their PA policies (Breda et al., 2018). The influence of actors at the supra-national level pushes the national governments to take stronger action related to PA and SB policies. A non-governmental sector can also play a major role in the encouragement of national governments to take action. For example, in the USA an organisation like the CDC may play a role in putting PA on the government's policy agenda. Finally, an enticement from the national level may often drive progress regarding PA and SB policies at the subnational, local, and institutional levels. The multi-level governance theory has been utilized in the "policy level" category of the CAPPA framework which distinguished between five levels: *international*; *national*; *subnational*; *local*; and *institutional*.

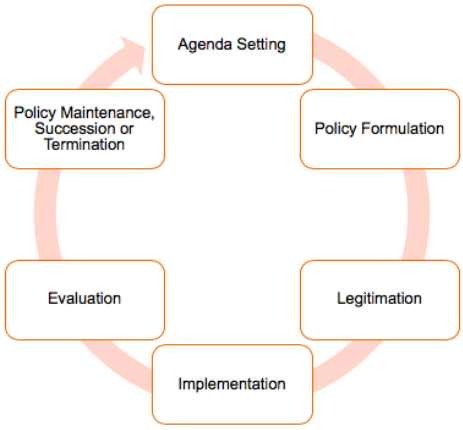
3.4.3. A theory of the policy cycle

The idea that the policy process can be cyclical goes back to the 1950s and the founder of the so called "policy sciences" Harold Lasswell. He outlined seven stages of the policy process: "intelligence, promotion, prescription, invocation, application, termination, and appraisal" (Lasswell & Lerner 1951, p. 32). Since then, many authors redesigned and redefined the policy cycle and modified it based on their research needs

(Colebatch, 2005). In *Theories of the Policy Cycle*, Jann and Wegrich listed several theories of the policy cycle (2007). They acknowledged that the policy cycle theories could also be perceived as the policy cycle *frameworks*, *models* or even *perspectives* rather than theories. It may be challenging to observe the policy cycle as a theory "because it is used to represent the policy process in multiple political systems" (Cairney, 2012, p. 32). Also, unlike most theories, the policy cycle does not explain what exactly happens and why. Rather, the theories that operate within the model usually offer a deeper understanding of the policy processes (Cairney, 2012). Regardless of whether we perceive the policy cycle as a theory, a model, or a framework, it is necessary to incorporate it into discussions about public policy (Cairney, 2012).

According to Jann & Wegrich, the differentiation between five stages – *agenda-setting*, *policy formulation*, *decision making*, *implementation*, and *evaluation* – has become the most "conventional way to describe the chronology of a policy process" (2007, p. 43). Cairney, on the other hand, emphasized that the six-stage model (Figure 4) is a generic model of the policy cycle and includes "*agenda-setting, policy formulation*, *legitimation*, *implementation*, *evaluation* and *policy maintenance, succession* or *termination*" (Cairney, 2012, p. 33).

Figure 4. Generic Policy Cycle, based on Cairney (2012)



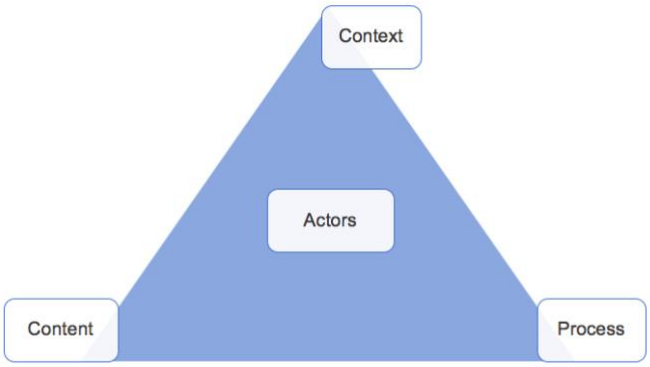
The CAPPA framework was informed by the generic policy cycle theory. In the CAPPA framework, the policy cycle was adjusted to the specific context of PA policy. Within the building block – "the stages of policy cycle" – eight stages are defined: *agenda setting*; *formulation*; *endorsement/legitimisation*; *implementation*; *evaluation*; *maintenance*; *succession*; and *termination*.

3.4.4. The health policy triangle framework

In 1994, Walt and Gilson developed the *health policy triangle framework* (Walt et al., 1994). The framework has been used in various public health studies to guide and support policy analysis (El-Jardali, Bou-Karroum, Ataya, El-Ghali, & Hammoud, 2014; Ma et al., 2015; Chersich, Newbatt, Ng'oma, & de Zoysa, 2018; Pradyumna & Saligram, 2016; Kilic, Kalaca, Unal, Phillimore, & Zaman, 2015; Weiwei, 2010; Gagnon & Labonté, 2013; Hercot, Meessen, Ridde, & Gilson, 2011). The *health policy triangle framework* has been employed in the analyses of various types of health policies in different countries such as China, Turkey, India, Lebanon, the UK, and some countries in sub-Saharan Africa. The framework is comprehensive, broad, and simple enough to be applicable to various policy contexts and countries regardless of their income level (Buse et al., 2005). The triangle-structured framework (Figure 5) acknowledges the importance of four key factors relevant to the process of policy

analysis – context, content, processes, and actors (Buse et al., 2005). It emphasizes their interdependence and mutual influence. The framework is especially useful because it may help policy makers and policy analysts to systematically analyse the "somewhat neglected place of politics in health policy" (Buse et al., 2005, p. 8).

Figure 5. Policy Analysis Triangle, based on Walt and Gilson (1994)



The health policy triangle framework informed the "scope of analysis" building block of the CAPPA framework, which has been expanded by three additional elements: *availability*, *political will*, and *effect*.

3.5. Systematic literature review

The systematic literature review is a standard method for reviewing literature within public health policy research in general (Orton, Lloyd-Williams, Taylor-Robinson, O'Flaherty, & Capewell, 2011; Fadlallah et al., 2019) and also within PA and SB research (Hoehner et al., 2008; O'Donoghue et al., 2016; Ajja, Beets, Chandler, Kaczynski, & Ward, 2015; Mabry, Koohsari, Bull, & Owen, 2016; Boberska et al., 2018; Liangruenrom, Craike, Biddle, Suttikasem, & Pedišić, 2019; Biddle, Bengoechea, & Wiesner, 2017). There are many advantages of using systematic literature reviews such as: the reduced risk of bias in eliminating and including studies in a review; the possibility to compare and comprehend findings of different studies; and conclusions are more accurate and reliable because of the rigorous methods used (Greenhalgh, 1997; Faggion, Bakas, & Wasiak, 2017). Furthermore, systematic reviews are considered to be more reliable, rigorous, and transparent than other types of literature reviews (Mallett, Hagen-Zankerb, Slaterc, & Duvendackd, 2012). This

thesis employed the systematic literature review method in two studies – *A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies* (further in text – *Global systematic scoping review*; Study 1, Chapter 4) and *A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies* (further in text – *Systematic review of instruments*; Study 3, Chapter 6). A pilot search through bibliographic databases and PROSPERO records was initially conducted to find out whether any previous systematic reviews have been published on these topics.

The first study of this thesis (Chapter 4) employed a systematic scoping review as a method for three key reasons: (i) scoping reviews are especially valuable in cases when a large body of relevant literature in a specific research field has not yet been comprehensively reviewed (Peters et al., 2015); (ii) no previous systematic or scoping review had been found to report on available analysis of indicators, development, and content of national-level PA and SB policies; and (iii) a systematic scoping review allows for mapping of the existing PA and SB policy literature while also maintaining the rigorous search strategy typical for systematic reviews. Therefore, one of the most thorough and comprehensive ways to determine the real state of and gaps within the PA and SB policy research field is to conduct a systematic scoping review with a broad search syntax. Study 1 followed the *Guidance for conducting systematic scoping review* (Peters et al., 2015).

The third study of this thesis (Chapter 6) employed a systematic review as a method for two key reasons: (i) no previous systematic review on instruments used for national-level PA/SB policy analysis had been found; (ii) a systematic review has specific methodological advantages over a narrative review (Greenhalgh, 1997; Faggion et al., 2017; Mallett et al., 2012).

3.5.1. Search strategy

The primary search in both studies the – *Global systematic scoping review* and the *Systematic review of instruments* – was performed through the following databases:

- PubMed/MEDLINE,

- Web of Science (including Science Citation Index Expanded - SCI-EXPANDED, Social Sciences Citation Index - SSCI, Arts & Humanities Citation Index - A&HCI, Conference Proceedings Citation Index- Science - CPCI-S, and Conference Proceedings Citation Index- Social Science & Humanities - CPCI-SSH),
- Scopus,
- SPORTDiscus,
- Networked Digital Library of Theses and Dissertations (NDLTD), and
- Open Access Theses and Dissertations (OATD) databases.

The following entries were used: *"physical inactivity"*, *"physical activity"*, *sitting*, and *sedentar** combined with two following entries: *policy* and *policies*. Full search syntax is available in Appendix B1. The systematic search was conducted through titles, abstracts, and keywords of the identified studies. The secondary search was performed through the references of the publications selected through the primary search as well as through authors' own archives. As suggested in the guidelines for conducting systematic reviews, besides focusing on academic literature, the reviews should also include a search of 'grey' literature (Greenhalgh, 1997; Peters et al., 2015). In order to detect governmental reports and other non-academic documents, additional searches were performed through *Google* and websites of the WHO and two key international networks for the promotion of PA: *Active Healthy Kids Global Alliance* and the GoPA!. A three-stage screening process was performed. In the first stage, automatic and manual exclusion of duplicates was conducted. The second stage included a manual screening of titles and abstracts. The third stage included assessment of eligibility of studies based on their full texts. As required by the protocols for conducting systematic reviews, the study selection process was done in duplicate. The discrepancies between the study selections were resolved by the principal supervisor of this PhD.

3.5.2. Inclusion criteria

To be included in the *Global systematic scoping review* the studies had to meet four criteria: (i) one of the intentions of the publication is to analyse PA/SB policy or 'sport for all' or recreation, NCD prevention, obesity, and/or other health-related policies that included an analysis of PA/SB; (ii) the study analysed policies on national level; (iii) the policy analysis was focused on the content of policy and/or process of policy development; and (iv) the full publication or its abstract is available in English.

Mainly due to the lack of resources, excluding non-English publications in systematic reviews is a common and widely accepted scientific practice. However, to be more inclusive in presenting the full scope of PA and SB policy research, the *Global systematic scoping review* included non-English academic publications. The studies were selected based on their abstract written in English. The full texts of the selected studies were translated for data extraction purposes.

To be included in the *Systematic review of instruments*, the studies had to meet these two criteria: (i) the publication encompasses an original description of an instrument that has already been used or that may be employed for national-level PA and/or SB policy analysis; (ii) the full text and/or the abstract of the publication is available in English. Included studies in both reviews could have been conducted using any research design.

Both the *Global systematic scoping review* and the *Systematic review of instruments* excluded conference/symposium summaries; commentaries and editorials; evaluations of policy campaigns and/or interventions; and analyses of international, subnational (e.g. regional, territorial, provincial), local, institutional or non-governmental PA/SB policies.

3.5.3. Data extraction

In the *Global systematic scoping review* the following data were extracted from the included studies: authors; year of publication; scope (national or international); analysed country/countries (names of countries and their number); the period in which policies were analysed; focus (e.g. PA, SB, sport etc.); summary of methods employed to analyse policies (e.g. content analysis, discourse analysis); use of a conceptual/theoretical framework; focus (e.g. PA, SB, NCD, obesity, sport etc.); conceptualisation of PA/SB policy (inclusion of definition and type of policy researched); and key national and international-level findings.

In the *Systematic reviews of instruments*, data extraction was conducted based on the CAPPA framework. The following data were extracted from the included publications: authors; year of publication; number of items; whether the instrument addressed PA,

SB or both; the instrument's *purpose* (auditing or assessment); what *sectors* does the instrument covers; what *types of policies* it covers; which *stages of the policy cycle* it addresses; and what is the *scope of policy analysis* that can be performed using the instrument.

3.6. Delphi method

The Delphi methodology is frequently used in health policy and promotion (Gill, Leslie, Grech, & Latour, 2013; Faulkner et al., 2011), within the field of PA and SB research in general (Gillis et al., 2013; Aarts, Schuit, van de Goor, & van Oers, 2011), and in PA policy research (Aro et al., 2016; Valente, Castellani, Larsen, & Aro, 2015). The Delphi method is sometimes commonly and interchangeably referred to as the 'Delphi technique' or 'Delphi survey'. It is a specific approach that may elicit and refine the views, ideas, and opinions of a group of people involved in a decisional process (Brooks, 1979). The method is considered to be well-suited to research that requires consensus-building and consensus-reaching procedures (Hsu & Sandford, 2007). Unlike regular surveys that usually answer "what is" questions, the Delphi method is focused on addressing "what could or what should be" (Miller, 2006). One of the primary advantages of the Delphi method compared to similar methods is the anonymity of experts included in the process, which can significantly reduce the influence of the dominant individuals in the group that aims to reach a consensus (Hsu et al., 2007).

In the literature about the Delphi method there is no consensus on: (i) which specific tools should be used to facilitate the process; (ii) the questionnaire design; (iii) the minimum or maximum number of panel members involved; and (iv) the minimum or maximum number of rounds necessary to finalize the process (Hsu et al., 2007; Mullen, 2003). However, in the development of Study 3, which employed the Delphi method – *The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) Framework* (Chapter 5) – some general principles were applied following the suggestions from the literature:

(i) Different tools and instruments are commonly used to administer a Delphi process (Gill et al., 2013; Hsu et al., 2007; Mullen, 2003; Stevenson, 2010). In Study 3, online questionnaires were employed using the *Survey Monkey* web platform. The members

of the expert panel were geographically dispersed as they are members of different universities around the world. It was therefore necessary to use online questionnaires which allowed for a simple, fast, and completely anonymous Delphi process.

(ii) As generally suggested in the literature, the questionnaires involved in the Delphi process should be developed after an extensive literature review (Mullen, 2003). This suggestion was followed in the development of the questionnaires for Study 2. The questionnaires were strongly informed by the findings of the *Global systematic scoping review* (Study 1). The questionnaires contained open-ended and close-ended questions and they included questions about the: name of the proposed framework; its overall structure; and the definitions and the names of all proposed categories and elements of the framework. The sample questionnaire from the first round is available in Appendix C.

(iii) Panel size in health application studies varies from four to 3000 (Cantrill, Sibbald, & Buetow, 1996). It is therefore recommended that the size of the panel "should be guided by the purpose of the investigation" (Cantrill et al., 1996, p. 69). Due to the fact that this thesis needed to follow a specific timeline and larger panels may be at risk of high drop-out rates (Mullen, 2003), the expert panel in Study 3 consisted of five experts. The experts involved in the Delphi decisional process were purposefully selected. Each of five experts has specific academic expertise necessary for the development of a new PA policy analysis framework including: PA policy analysis; measurements and surveillance in public health; quantitative methods; qualitative methods; epidemiology of SB and PA; psychology; and political science.

(iv) Some experts outline that most studies employ two or three rounds and that this is a preferred number of rounds in the literature about Delphi (Mullen, 2003; Sumsion, 1998). In the development of the questionnaires for Study 3, the specific number of rounds was not predetermined. Before the start of the Delphi process, the expert panel agreed that in the final round, a perfect consensus should be achieved on at least 95% of all discussion points, while the agreement on up to 5% of all points may be achieved with a supermajority vote. The Delphi process in Study 3 ended with three rounds in total.

To further enhance anonymity and eliminate possible bias, the Delphi process was facilitated by an independent researcher outside of the expert panel team who held the role of a Delphi moderator. Before each round, the Delphi moderator circulated an

email invitation to all panel members which contained: (i) a web link to the survey; and (ii) the supplementary information sheet with an explanation of the draft framework structure and the proposed definitions of the categories and of the framework. After each round, the Delphi moderator collected and analysed all survey responses and provided detailed feedback to the expert panel members. The moderator's feedback included: (i) summary comments related to all sections of the Delphi survey; and (ii) anonymised individual responses specified by the panel members.

To strengthen the CAPPA framework developed through Delphi, Study 3 also employed a consultation process. The consultation process is common in PA policy research and several studies that developed tools, instruments, or frameworks utilised it (Bull et al., 2014a; Schmid et al., 2006; Shephard et al., 2004). The consultation process in Study 3 had two rounds and it involved ten PA policy stakeholders. They provided written feedback on all categories and elements of the CAPPA framework. The selection of the consultation panel was purposeful by applying two main criteria: expertise in PA policy research and/or participation in the development of PA policy. The consultation panel members for the development of the CAPPA framework were purposefully selected from diverse contexts, such as academia, public health policy, consultancy, and national and/or international organisations for promotion of PA.

3.7. Survey method

The survey method is commonly used across various research disciplines and fields, including political science, public health, and PA policy. Using the survey method has various advantages such as relatively low costs and "the production of empirical data based on real-world observations" (Kelley, Clark, Brown, & Sitzia, 2003, p. 262). The most suitable method to employ in Study 4, an international audit and assessment of national-level PA and SB policies, was an online questionnaire. This was due to three key reasons: (i) development of an online questionnaire has minimal costs, which is suitable for a PhD project; (ii) an online questionnaire enables a straightforward data collection process which does not rely on a specific time-zone and is easily accessible to people from low-, middle-, and high-income countries; and (iii) relevant research of similar scope in the area related to PA and NCD policies also employed online

questionnaires to gather data (Ramirez Varela et al., 2018b; Ramirez Varela et al., 2017; World Health Organization, 2014b, 2012, 2016, 2018c).

3.7.1. Development of the *GoPA! Policy Inventory version 3.0*

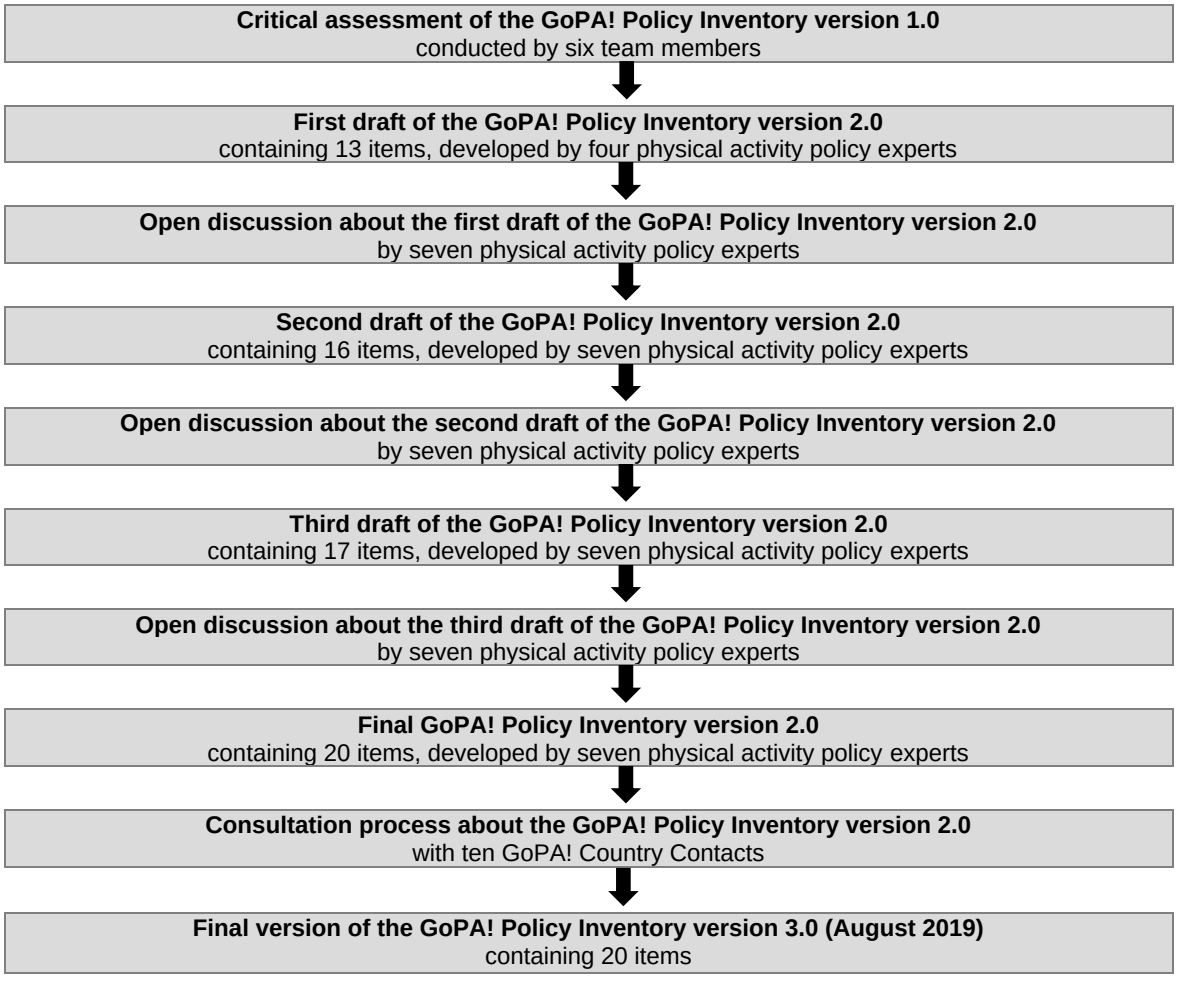
As suggested in the literature, the development of a questionnaire should be informed by an extensive literature review (Converse & Presser, 1986; Bradburn, Sudman, & Wansink, 2004). The development of the questionnaire for Study 4 was informed by the *Global systematic scoping review* (Study 1) and the *Systematic review of instruments* (Study 3). Study 3 served to identify and critically evaluate instruments for the audit and assessment of national-level PA/SB policies. The instruments were assessed against the CAPPA framework developed in Study 2. The CAPPA framework informed the development of the *GoPA! Policy Inventory version 3.0*, a questionnaire used in Study 4.

The final version of the questionnaire *GoPA! Policy Inventory version 3.0* for Study 4 was developed in three stages (Figure 6). The first stage was a critical assessment of the *GoPA! Policy Inventory version 1.0*, which was found through the search conducted in Study 3. The *GoPA! Policy Inventory version 1.0* was critically assessed based on a systematic literature review of other relevant PA/SB policy instruments and comprehensive analysis of: (i) the HEPA PAT version 2.0 (Bull et al., 2015); (ii) the monitoring framework from the EU Recommendation on Health-Enhancing Physical Activity Across Sectors (Council of the European Union, 2013); and (iii) the CAPPA framework. The *GoPA! Policy Inventory version 1.0*, was pilot tested in 14 countries. The GoPA! Country Contacts – public health and PA policy experts and/or members of government institutions experienced in the PA and public health area – were involved in the pilot testing and provided feedback, which informed the development of the *GoPA! Policy Inventory version 2.0*. In addition, the second stage involved an open discussion among seven PA policy experts through three rounds, which resulted in the refinements of the *GoPA! Policy Inventory version 2.0.* The discussions were facilitated via emails, multiple *Skype* conference calls, and a face-to-face meeting at the International Society of Behavioral Nutrition and Physical Activity (ISBNPA) conference in Prague in June 2019 where the findings from Study 2 were also

presented. The *GoPA! Policy Inventory version 2.0* was revised three times based on these discussions.

The third stage involved one round of open consultation with ten GoPA! Country Contacts. They provided extensive feedback on the *GoPA! Policy Inventory version 2.0* and suggested 27 areas for the Inventory's improvement. The expert team involved in the second phase reviewed all suggestions and incorporated the vast majority in the development of the *GoPA! Policy Inventory version 3.0.* The final version of the *GoPA! Policy Inventory version 3.0* contains: (i) a consent form with a link to the *Information for participants involved in the study* (Appendix E1); (ii) three questions about the respondent/GoPA! Country Contact; and (iii) twenty questions about PA and SB policies. The *GoPA! Policy Inventory version 3.0* is available as an online survey in *Qualtrics* software and as an interactive *Word* document (Appendix E3).

Figure 6. The development process of the *GoPA! Policy Inventory version 3.0* (August 2019)



3.7.2. Data collection and sample in Study 4

The data collection for Study 4 took place from October 2019 to March 2020. The online version of the *GoPA! Policy Inventory version 3.0* was distributed to 173 GoPA! Country Contacts. The GoPA! Country Contacts were invited to participate in the study and provide information on national PA and SB policies in their countries. The GoPA! Country Contacts were identified in three main ways: (i) using PubMed search engine of the PA-related literature; (ii) from the lists of focal contact points of international organisations and/or networks for PA promotion; and (iii) from the lists of focal contact points of the WHO regional offices (Ramirez Varela et al., 2017). In order to be selected to become a GoPA! Country Contact, an expert needs to have reputable experience in the area of PA and public health as a member of international networks and/or organisations for PA promotion, government institutions, or as a researcher (Ramirez Varela et al., 2017). The GoPA! Country Contacts participated in the study on a voluntary basis and all Country Contacts provided their informed consent before proceeding with responses to the questionnaire. Prior to the distribution of the *GoPA! Policy Inventory version 3.0,* the *Victoria University Human Research Ethics Committee* approved the study protocol (ref: HRE19-057). The *GoPA! Policy Inventory version 3.0* was circulated to the Country Contacts as an online survey. Responses were obtained from 76 countries and the response rate was 44%. Fifty-one per cent of countries were high-income, 28% were upper-middle-income, and 21% were low- and lower-middle-income countries. The sample for Study 4 included countries from all six world regions, as classified by the WHO. The most represented region was the European region (38%), followed by the Region of Americas (22%). The least represented region was the South-East Asia Region (5%). The African Region (12%), the Western Pacific Region (11%), and the Eastern Mediterranean Region (11%) were similarly represented.

3.7.3. Policy variables

The questionnaire asks about the: (i) availability of PA and SB policies and other national policy documents legislation, strategies, or action plans that outline the government's intention to increase population PA and tackle population SB and the publication year, time frame, issuing body, and web link; (ii) level of PA and SB policy

implementation; (iii) availability of national guidelines on PA and SB and availability of specific guidelines for different target groups; (iv) availability of national PA and SB surveillance/monitoring; (v) ministries or departments in the national government that have an active role in the promotion of more PA and/or less SB; (vi) availability of quantifiable national targets for PA and SB; (vii) level of comprehensiveness of national PA and SB policy; and (viii) level of effectiveness of national PA and SB policy. The questions on comprehensiveness, implementation, and effectiveness of policies had ordinal response scales (0-10), with a higher value on the scale representing a better score.

The following elements of the CAPPA framework are addressed in the questions on the *GoPA! Policy Inventory version 3.0*: *audit, assessment, formal written policies, written guidelines, formal procedures, actors, effects, implementation,* and *availability*. When referring to the *availability of PA and SB policy*, the following items were considered: (i) availability of formal written PA and SB policies (e.g. policy documents, strategies, action plans, legislation); (ii) availability of written guidelines; (iii) availability of quantifiable national targets; and (iv) availability of national PA and SB surveillance or monitoring. This is because these are considered to be standard indicators of the government's commitment or intention to support PA promotion and SB reduction across the population (Bull et al., 2004a; Bellew et al., 2008; Daugbjerg et al., 2009).

As suggested by the CAPPA framework, the questionnaire was developed to contain items for both *audit* and *assessment*. The majority of questions are audit-type questions. Questions related to the level of PA and SB policy implementation, comprehensiveness, and effectiveness are assessment-type questions.

Questions six and seven are related to policy implementation. In question six, policy implementation was defined as translating statements, ideas, goals, and/or objectives mentioned in the policy documents into practice. For example, a policy document may mention building new facilities as one of the strategies to increase participation in physical activity. Implementation of this statement means having the new facilities actually being built. In question seven, the GoPA! Country Contacts needed to provide a name of and/or link to the published sources (e.g. journal article, research document,

technical report, thesis, dataset) that informed their answer. If their estimate was not informed by a specific source, they were asked to write “my personal assessment”.

Questions 17 and 18 are related to the comprehensiveness of the country’s current PA and SB national policy (written, unwritten, or lack thereof). A comprehensive policy: (i) uses multiple strategies for the promotion of more PA and less SB (e.g. individual-oriented behaviour change and environmental-focused interventions); (ii) covers multiple settings and sectors (e.g. health, transport, sport, and urban planning and design); (iii) defines quantifiable targets; (iv) contains initiatives for specific target groups (e.g. children, pregnant women, people with chronic diseases); (v) includes a public awareness component (e.g. social marketing campaigns); (vi) defines the budget for implementation; (vii) includes multi-sectoral and/or cross-sectoral approaches; and (viii) defines policy evaluation strategies. In question 17, the GoPA! Country Contacts were asked to provide the name of and/or link to the published sources that informed their answer. If their assessment was not informed by any specific source, they were asked to write “my personal assessment”.

Questions 19 and 20 are related to the effectiveness of the country’s current national policy in increasing population PA and tackling population SB. Overall national PA/SB policy is considered to be effective, if, as a result of it, the population’s PA levels have increased (or remained stable) or the population’s SB has decreased (or remained stable) as planned. In the questionnaire, it was stressed that it is important to note how some policies may have a *direct* effect and some an *indirect* effect. For example, changes in the funding of the national transportation scheme to favour public transport may ultimately result in more utilitarian PA, such as walking to and from the tram stop. On the other hand, changes in local policies, such as opening school grounds for public use, may have more direct effects on PA levels. One way to assess the effectiveness of the overall PA/SB policy is to determine whether the quantifiable targets outlined in the policy documents have been met. This information can usually be obtained from policy evaluation reports or from national surveillance data. If the effects of the national policy have not been formally evaluated (by a government or non-government agency), Country Contacts were asked to assess policy effectiveness based on other available research that investigated the effects of policy on population PA/SB levels. In question 20, the Country Contacts were requested to specify the name

of and/or link to the published sources which informed their answer. If their assessment was not informed by a specific source, they were supposed to write “my personal assessment”.

3.7.4. Data analysis

The data analysis was conducted using *Statistical Package for the Social Sciences* (SPSS), version 23 (SPSS Inc., an IBM Company, Chicago, IL, USA). Ordinal data obtained from three assessment-type questions addressing comprehensiveness, implementation, and effectiveness of PA and SB policies, were presented using medians and their 95% confidence intervals (CI) and interquartile ranges. Categorical data were presented as percentages and their 95% confidence intervals. Data were analysed for the whole sample and stratified by country’s income level (GNI per capita, calculated using the Atlas method) according to the World Bank (2019) and world regions. World regions were divided according to the following classification by the WHO: African Region; European Region; Eastern Mediterranean Region; Region of the Americas; South-East Asia Region; and Western Pacific Region (World Health Organization, 2020b). For ordinal variables, differences in PA and SB policies between low- and lower-middle, upper-middle, and high-income countries and between the WHO regions were analysed using the Kruskal-Wallis test. For categorical variables, the Chi-square test was used with $p < 0.05$ as a threshold for statistical significance.

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DECLARATION OF CO-AUTHORSHIP AND CO-CONTRIBUTION: PAPERS INCORPORATED IN THESIS

This declaration is to be completed for each conjointly authored publication and placed at the beginning of the thesis chapter in which the publication appears.

1. PUBLICATION DETAILS (to be completed by the candidate)

Title of Paper/Journal/Book:	A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies. International Journal of Behavioral Nutrition and Physical Activity 15. article no. 123.

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Institute: Institute for Health and Sport Candidate's Contribution (%): 70

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2. CANDIDATE DECLARATION

I declare that the publication above meets the requirements to be included in the thesis as outlined in the HDR Policy and related Procedures – policy.vu.edu.au.

[redacted] 18.05.2020.

Signature **Date**

3. CO-AUTHOR(S) DECLARATION

In the case of the above publication, the following authors contributed to the work as follows:

The undersigned certify that:

1. They meet criteria for authorship in that they have participated in the conception, execution or interpretation of at least that part of the publication in their field of expertise;
2. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

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3. There are no other authors of the publication according to these criteria;
4. Potential conflicts of interest have been disclosed to a) granting bodies, b) the editor or publisher of journals or other publications, and c) the head of the responsible academic unit; and
5. The original data will be held for at least five years from the date indicated below and is stored at the following **location(s)**:

December 2019, electronically stored on VU R drive. Hard copies are stored in a locked cabinet in office PB201 at VU Footscray Park campus.

Name(s) of Co-Author(s)	Contribution (%)	Nature of Contribution	Signature	Date
Grant O'Sullivan	4	- conducted duplicate study selection - read, approved and contributed to writing	[redacted]	14/09/2019
Karen Milton (supervisor)	4	- conceptualised the review - read, approved and contributed to writing		14/09/2019
Stuart J.H. Biddle (supervisor)	4	- conceptualised the review - read, approved and contributed to writing		13/09/2019
Adrian Bauman	2.5	- read, approved and contributed to writting		13/09/2019
Fiona Bull	2.5	- read, approved and contributed to writting		18/05/2020
Sonja Kahlmeier	2.5	- read, approved and contributed to writting		16/09/2019
Michael Pratt	2.5	- read, approved and contributed to writting		14/09/2019
Zeljko Pedisic (principal supervisor and corresponding author)	8	- contributed to the overall idea, study conceptualisation, and the systematic search strategies - checked for inconsistencies in the extracted data and revised the tables		13/09/2019

Updated: September 2019

4. A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies[1]

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Abstract

Background: National policy approaches to physical activity (PA) promotion and sedentary behaviour (SB) reduction are needed to address rising rates of non-communicable diseases. Understanding the policy process and impact through robust research and evaluation is crucial for facilitating successful reforms in national health policy. This scoping review, therefore, aimed to map the evidence on indicators, development, and content of national PA and/or SB policies globally.

Methods: A systematic search of academic and grey literature was conducted through six bibliographic databases, Google, and websites of three large organisations for PA promotion.

Results: Out of 24,872 screened documents, 203 publications from 163 studies were selected. The selected studies investigated PA/SB policies in 168 countries worldwide, and we provided summary results for each of the countries. Overall, 69%, 29%, and 2% of the analyses of national PA/SB policies were conducted for high-, middle-, and low-income countries, respectively. Twenty-two percent of the studies mentioned SB policies as part of their analysis, with only one study focusing solely on assessing SB policies. Operational definitions of policy were found in only 13% of publications. Only 15% of the studies used a conceptual or theoretical framework. A large variety of methods were used for data collection and analysis of PA/SB policy.

Conclusions: We found that PA policy research is much more developed than it was considered several years ago. Research around SB policies is still in its infancy, but it seems to have experienced some positive progress in the last few years. Three key issues were identified that should be addressed in further research: (i) there is a lack of PA/SB policy research in low- and middle-income countries, which is an important limitation of the current body of evidence; (ii) the definition of policy varied significantly across studies, and most studies did not rely on any theoretical framework, which may impede cross-study comparisons; and (iii) studies have used a variety of methods to analyse policy, which may also cause problems with comparability. Future PA/SB policy research should aim towards a clearer conceptualisation of policy, greater reliance on existing theoretical frameworks, and the use and further development of standardised methods for PA/SB policy analysis.

Key words:

physical activity, national policy, sedentary behaviour, sitting, physical inactivity, national plan, strategy

4.1. Background

More than 40 million people a year die from noncommunicable diseases (NCDs), of which 15 million deaths are considered premature (World Health Organization, 2018d). This accounts for around 70% of overall global mortality (World Health Organization, 2018e), with high rates in low-, middle-, and high-income countries (World Health Organization, 2018d). Insufficient physical activity (PA) and sedentary behaviour (SB) are among the key risk factors for NCDs. Global estimates indicate that the latter was responsible for 3.8% of deaths from 2002 to 2011 (de Rezende et al., 2016) and the former for 9% of deaths in 2008 (Lee et al., 2012). In 2013, the estimated cost of insufficient PA to worldwide health-care systems was around 53.8 billion international dollars (Ding et al., 2016). Insufficient PA and prolonged sitting are, therefore, not just significant health risk factors for global mortality but also a vast economic burden for national health care systems. National policy approaches to PA promotion and SB reduction are an essential aspect needed to address rising rates of NCDs (Bellew et al., 2008).

The policy environment is perceived as one of the important determinants influencing active living at the population level (Sallis et al., 2006). The main goals of public policy related to PA are to allow for creating supportive programs, infrastructure, and environments for people to engage in physically active lifestyles (Bellew et al., 2011; World Health Organization, 2017a). Research related to PA has informed the development of policy in the health sector and non-health sectors such as education, transport, sport, and environment (Daugbjerg et al., 2009; Vuori, Lankenau, & Pratt, 2004; World Health Organization, 2010b). PA policy research has been developing since 1990s. This field of research lagged behind the research on health outcomes of PA by more than 30 years (Ramirez Varela et al., 2018a; Morris, Heady, Raffle, Roberts, & Parks, 1953). Therefore, PA policy research is still widely considered to be an area in need of more research, particularly in terms of large-scale evaluations of implementation and impact (Ramirez Varela et al., 2018a; Schmid et al., 2006; Breton et al., 2010).

Since 2000, two key global efforts have occurred in PA planning and policy (Kohl et al., 2012). In 2002, The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) in the United States of America (USA) conducted international consultations on PA policy development (Shephard et al., 2004). The consultations informed the development of the *Global Strategy on Diet, Physical Activity and Health*, which is perceived to be the first major global effort related to PA policy (World Health Organization, 2004). The strategy targeted governments, along with non-governmental agencies, as the main agents of social change that can enhance population PA levels by creating supportive environments. The second major initiative was the United Nations (UN) high-level meeting on NCDs in 2011, where physical inactivity was acknowledged as an important determinant of NCDs globally (Kohl et al., 2012). Along with these major global efforts, various international leadership and advocacy networks were established to support the promotion of PA, such as: *Red Actividad Fisica de las Americas*/Physical Activity Network of the Americas (RAFA/PANA) in 2000; Asia Pacific Physical Activity Network (AP-PAN) and the European Network for the Promotion of Health-Enhancing Physical Activity (HEPA Europe) in 2005; Global Advocacy for Physical Activity (GAPA) in 2007; Africa Physical Activity Network (AFRO-PAN) in 2010; Global Observatory for Physical Activity (GoPA!) in 2012; and Active Healthy Kids Global Alliance in 2014.

Studies on SB form a relatively new field of behavioural epidemiology. Interest in this area has started growing rapidly in the last decade, after epidemiological evidence indicated that long periods of sitting might pose a health risk, irrespective of one's PA level (Owen et al., 2009). It should be noted, however, that recent studies have questioned the validity of evidence on SB as an independent health risk factor (Pedišić, 2014; Pedišić et al., 2017; Ekelund et al., 2016; Dumuid et al., 2017). The main goals of emerging SB related public policy is to allow for creating supportive programs, infrastructure, and environments to support people to minimise their time spent in SB and to break prolonged periods of SB. Although evidence on the prevalence, trends, determinants, and health outcomes of SB is emerging rapidly, the research around SB policies is scarce and still in its infancy. The Sedentary Behaviour Research Network was recently established as an international association for researchers and health

professionals focusing specifically on SB, to support research in this area (Tremblay et al., 2017).

The development of the Global Strategy on Diet, Physical Activity and Health, along with several other global awareness-raising initiatives from the early 2000s, was viewed as a potential turning point after which more countries would establish national policies and strategies related to PA (Bull et al., 2004a). However, after a decade, the majority of countries had made limited progress on PA policy development (World Health Organization, 2016; Sallis et al., 2016). It has been suggested that further research is needed to provide new theoretical and practical insights to inform future PA and SB policy development (Kohl et al., 2012; Schmid et al., 2006). Understanding the policy process and impact through robust research and evaluation is crucial for facilitating successful reforms in national health policy (Walt et al., 1994) and to support all countries to prioritise and commit to increasing PA promotion (Bull et al., 2014a).

A comparative scoping review from 2016 analysed three types of scientific evidence to inform physical activity policy (Rütten et al., 2016) and a structured literature review and citation network analysis published in 2018 mapped the historical development of PA and health research (Ramirez Varela et al., 2018a). However, the actual level of development of the PA/SB policy research has never been systematically evaluated. This systematic scoping review of academic and grey literature aimed to map the evidence on the indicators, development, and content of national PA and/or SB policies. We addressed the following four key questions: (i) Which countries and world regions have been covered by this type of research?; (ii) How is 'policy' conceptualised within the studies and to what extent were PA/SB policy studies based on conceptual/theoretical frameworks?; (iii) Which methods have been used for analysing PA/SB policies?; and (iv) What are the potential future directions of research in this area? This review will help inform national PA/SB policy development, public health promotion of physically active lifestyles, and future research on PA and/or SB policies.

4.2. Methods

4.2.1. Literature search

The primary search was performed through PubMed/MEDLINE, Scopus, Web of Science (including Science Citation Index Expanded - SCI-EXPANDED, Social Sciences Citation Index - SSCI, Arts & Humanities Citation Index - A&HCI, Conference Proceedings Citation Index- Science - CPCI-S, and Conference Proceedings Citation Index- Social Science & Humanities - CPCI-SSH), SPORTDiscus, Open Access Theses and Dissertations (OATD), and Networked Digital Library of Theses and Dissertations (NDLTD) databases using the entries *"physical inactivity"*, *"physical activity"*, *sitting*, and *sedentar** in combination with the entries *policy* and *policies.* The full search syntaxes used for each database are available in Additional file 1. The search was performed through titles, abstracts and keywords of the articles. The secondary search was done through the references of all articles selected in the primary search and authors' own archives. Additionally, for governmental reports and other non-academic documents, searches were conducted through Google and websites of the WHO and two major international PA promotion networks: the GoPA and the Active Healthy Kids Global Alliance.

4.2.2. Inclusion criteria

To be included in the review publications had to meet the following criteria:

(1) One of the aims of the publication was to analyse PA and/or SB policy or obesity, NCD prevention, sport for all/recreation, and/or other health-related policies that included an analysis of PA and/or SB;

(2) The study analysed national-level policies. For federations and multi-state countries, only studies analysing the highest level governmental policies were taken into account (for example Australia and the USA). In the United Kingdom (UK), policy development can occur for all of the UK, as well as for individual home countries. Thus, policies were also included for Scotland, England, Wales, or Northern Ireland, for consistency with previous analyses of national PA/SB policies globally (Daugbjerg et al., 2009; Ramirez Varela et al., 2016; Tremblay et al., 2014; Tremblay et al., 2016).

(3) The policy analysis was focused on the process of policy development and/or content of policy;

(4) The full publication or at least its abstract was available in English.

We excluded publications that: evaluated impact of policy changes on levels of PA or SB; evaluated public opinion and/or knowledge about PA/SB policy/guidelines; analysed international, subnational (e.g. local, regional, territorial, provincial), or non-governmental PA/SB policies/guidelines; focused on policy implementation; or provided general, non-country specific policy recommendations.

4.2.3. Definition of policy

In accordance with Colebatch (2002) and Birkland (2014), for the purpose of this study we defined public policy as 'a broad orientation', 'an indication of normal practice', 'a specific commitment', or 'a statement of values' (Colebatch, 2002) with the following attributes: (i) it is made by governments on the *"public's"* behalf; (ii) it is structured as a response to a problem and orientated towards a desired state or a goal to solve the problem; and (iii) it is implemented and interpreted by private and public actors who have various understandings of solutions and problems (Birkland, 2014). It should be noted that this definition does not represent authors' general view on how public policy should be defined. While some studies proposed more specific definitions of policy (Bull et al., 2004a; Daugbjerg et al., 2009; Pate, Trilk, Wonwoo, & Jing, 2011), we used this broad and inclusive definition simply because the aim of our scoping review was to capture all the various research related to PA and SB policy. In previous studies, national PA/SB guidelines were considered as a policy document (Coenen et al., 2017) or a policy paper (Seppälä, Hankonen, Korkiakangas, Ruusuvuori, & Laitinen, 2017), an area of policy content (Milton et al., 2015a) or an element of a successful policy approach (Bull et al., 2011, 2015). Some authors suggested, however, a clear distinction should be made between a *policy* (defined as a policy document) and PA and health *guidelines* or *recommendations* (Daugbjerg et al., 2009; Christiansen et al., 2014; Brown, Rosenkranz, Kolt, & Berentson-Shaw, 2011). For the purpose of this review we considered national PA/SB guidelines as an indicator of government policy, because the act of issuing national PA/SB guidelines indicates that the government (as their issuing body) has policy supportive of promoting PA and reducing SB. To be as inclusive as possible, in the current study we, therefore, included studies analysing national-level PA/SB guidelines formally adopted and/or published by the government.

We acknowledge, however, that there is no consensus among the researchers on this matter and that our definition of national PA/SB guidelines as an indicator of government policy may not necessarily be applicable in future PA/SB studies.

4.2.4. Definition of policy analysis

No consensus has been achieved among researchers on what constitutes a policy analysis. Kustec-Lipicer (2012) stated that synonyms for *policy evaluation* available in the literature are *analysis, appraisal, assessment, adjudgement, judgement, examination, critique, review, inspection, measuring* and *grading* of policy. For the purpose of this study we considered the term *policy analysis* broadly and used it as a synonym for *evaluation, assessment,* and *review* of policy.

4.2.5. Study selection and data extraction

The study selection was conducted in July 2017, independently by two authors, BKP and GO, whilst a third author, ZP, resolved discrepancies between the study selections. Extraction and tabulation of data was done by one author (BKP). Two authors (BKP and ZP) independently checked for inconsistencies in the extracted data and revised the tables (Additional files 2-5). From every included study, we extracted data on its scope (national or international), number of covered countries, focus of the study (including type of the analysed policy, country, and specific target population), the period from which policies were analysed, summary of methods used to analyse policies, and main national-level and international-level findings.

4.2.6. Categorisation of countries

The World Bank's list of 218 economies from June 2017 was used as the list of countries/states/regions/economies (2017). As mentioned above, we included four UK's home nations separately, so the total number of countries encompassed in this review was 221. The authors are aware that some countries/states/regions/economies on the World Bank's list cannot be termed as "countries" because of disputable political and legal issues. However, for the purpose of brevity, we used the term *country* as an abbreviation for "countries/states/regions/economies" on the World Bank's list. The categorisation of the countries into four income groups: low income; lower middle

income; upper middle income; and high income, as well as the division of countries into regions was also done using the World Bank's list. According to the list *Europe and Central Asia* constitute one region. To enable drawing conclusions about geographically more specific areas, we additionally divided Europe into four regions as defined by the Publications Office of the European Union (EU) as part of EuroVoc.

4.3. Results

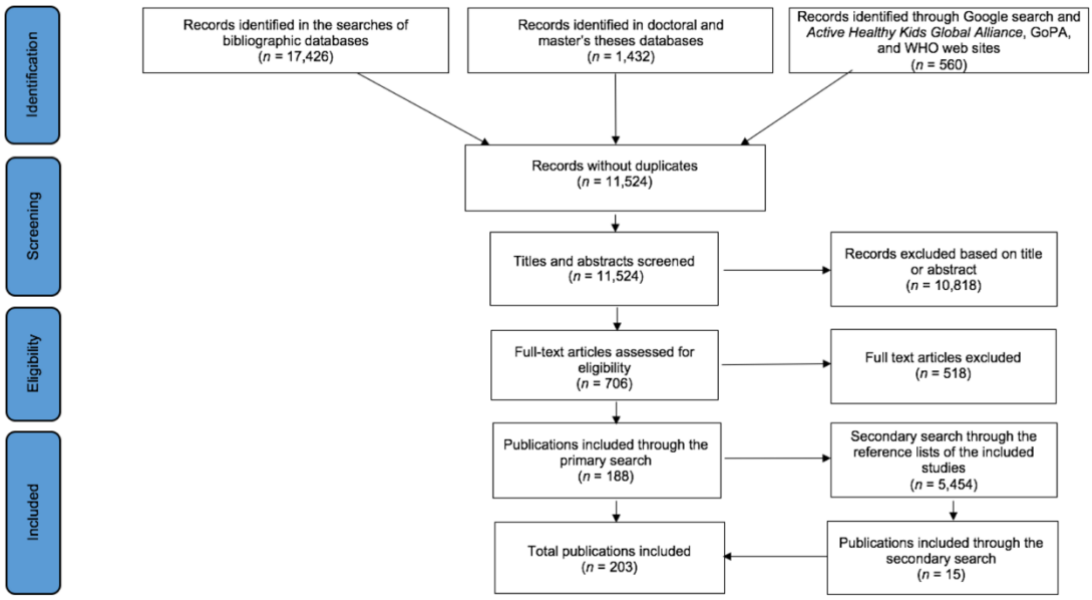
4.3.1. General findings

In total, we screened 24,872 documents. Two hundred and three publications (Kahlmeier et al., 2015; Coenen et al., 2017; Milton et al., 2015a; Bull et al., 2004a; Ramirez Varela et al., 2017; Bellew et al., 2011; Daugbjerg et al., 2009; Bull et al., 2014b; Schöppe et al., 2004; Bellew et al., 2008; Christiansen et al., 2014; Aro et al., 2016; Hämäläinen et al., 2016a; Hämäläinen et al., 2015; Hämäläinen et al., 2016b; Rütten et al., 2013; World Health Organization, 2011; Eyler, 2011; Lachat et al., 2013; Branca et al., 2007; Craig, 2011; Active Healthy Kids Canada, 2010; World Health Organization, 2014a; Bull et al., 2014c; Prévot-Ledrich et al., 2016; Bull et al., 2014d; Woods et al., 2012; Wu, 2015; Pratt et al., 2016; Ramirez Varela et al., 2016; Tremblay et al., 2014; Tremblay et al., 2016; Manyanga et al., 2016a; Bergsgard et al., 2007; Vuori et al., 2004; World Health Organization, 2010b; Pate et al., 2011; Seppälä et al., 2017; Brown et al., 2011; Active Healthy Kids Canada, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016; Adeniyi et al., 2016; Aguilar-Farias et al., 2016; Akinroye et al., 2014; Al-Bahlani & Mabry, 2014; Al-Kuwari, Ibrahim, Hammadi, & Reilly, 2016a, 2016b; Alderman, Smith, Fried, & Daynard, 2007; Aman, 2005; Amornsriwatanakul et al., 2016a, 2016b; Ballesteros Arribas, Dal-Re Saavedra, Perez-Farinos, & Villar Villalba, 2007; Barnes et al., 2016; Barnes et al., 2013; Bell-Altenstad & Vail, 1995; Bellew, 2004; Bercovitz, 1998; Bornstein & Pate, 2014; Bornstein, Pate, & Buchner, 2014; Bornstein, Pate, & Pratt, 2009; Bravo & Silva, 2014; Bréchat et al., 2009; Bull, Schoppe, Bauman, & Weston, 2004c; Burghard, Knitel, van Oost, Tremblay, & Takken, 2016a, 2016b; Cavill, Foster, Oja, & Martin, 2006; Ceccarelli, 2011; Chen, 1997; Chimeddamba, Peeters, Walls, & Joyce, 2015; Clarke & Ojo, 2017; Costa Januário, de Rebocho Lopes, & Carvalho, 2012; da Silva, 2007; de Villiers et al., 2010; Dentro et al., 2014a, 2014b; Draper et al., 2014a, 2014b; Egger, Donovan, Giles-Corti, Bull, & Swinburn, 2001; Fullagar, 2002; Fullagar, 2003; Galaviz et al.,

2016; Gillon, 2010; Gomez, 2015; González et al., 2016; González et al., 2014; Gray et al., 2014; Green, 2009; Guo & Pan, 2016; Halliday, Mutrie, & Bull, 2013; Harrington et al., 2014a, 2014b; Harrington et al., 2016a, 2016b; Herrera-Cuenca et al., 2016a, 2016b; Huang et al., 2016a, 2016b; Jebb, Aveyard, & Hawkes, 2013; Kalman & Hamřík, 2013; Kalman, Hamrik, Pavelka, & Dohnal, 2008; Katapally et al., 2016a, 2016b; Katikireddi, Higgins, Bond, Bonell, & Macintyre, 2011; Katzmarzyk et al., 2016a, 2016b; Kobayashi, Hoye, & Nicholson, 2017; Koh, 2010; Kranzler et al., 2013; Kruusamäe, Kull, Mooses, Riso, & Jürimäe, 2016; Kudláček, Vašíčková, & Neuls, 2012; Lagos, 2016; Larsen et al., 2016, 2017; Liu et al., 2016; Liukkonen et al., 2014; Lu & Henry, 2011; Maddison, Dale, Marsh, LeBlanc, & Oliver, 2014; Maddison et al., 2015, 2016; Manyanga et al., 2016b; Matalas, 1997; Méndez, 2015; Milton & Grix, 2015; Mota, MJ, Raimundo, & Sardinha, 2016; Murphy & Waddington, 1998; Musingarimi, 2008, 2009; Nardo, et al., 2016; Nishtar et al., 2006; Nyström et al., 2016a, 2016b; Ocansey et al., 2014; Ocansey et al., 2016; Onywera et al., 2016a, 2016b; Pérez-Escamilla, 2016; Piggin, 2008; Piggin & Hart, 2017; Pilar Rodriguez et al., 2012; Prista et al., 2016; Prista, Picardo, Ribeiro, Libombo, & Daca, 2014; Ramadan, Vuori, Lankenau, Schmid, & Pratt, 2010; Reddy, Coopoo, Norris, Puoane, Kruger et al., 2007; Reilly, Dick, McNeill, & Tremblay, 2013, 2014; Reilly, Johnstone, McNeill, & Hughes, 2016a, 2016b; Rodriguez Martinez et al., 2014; Rodriguez Martinez, Galaviz, Ulloa, Gonzalez-Casanova, & Lopez Y Taylor, 2014; Roman-Viñas et al., 2016; Salinas & Vio, 2003; Schranz et al., 2014a, 2014b; Schranz et al., 2016a; Schranz et al., 2016b; Sember et al., 2016; Sharif et al., 2016a, 2016b; Skille & Solbakken, 2011; Smith, Jones, Houghton, & Duffell, 2016; Standage et al., 2014; Stratton et al., 2016; Stratton et al., 2014; Stuij & Stokvis, 2015; Tammelin et al., 2016a, 2016b; Tan, 2015; Tanaka et al., 2016a, 2016b; Tremblay et al., 2011; Tyler et al., 2016; Uys et al., 2016; Vallgårda, 2015; van Mechelen, 1997; Vuori, Paronen, & Oja, 1998; Wachira, Muthuri, Tremblay, & Onywera, 2014a, 2014b; Wijtzes et al., 2016a, 2016b; Wilkie et al., 2016a, 2016b; Xu, Xiao, & Tan, 2014; Yoonkyung et al., 2016a, 2016b; Zaabi et al., 2016a, 2016b; Zembura, Goldys, & Nalecz, 2016; Gråstén, Liukkonen, Jaakkola, & Tammelin, 2014; World Health Organization, 2007b, 2010c, 2010d, 2010e, 2015; Oja & Titze, 2011) from 163 original studies met the selection criteria (Figure 7). A list of all studies with a short description, including the year of publication, key focus, study period, and methods, is presented in Additional file 2. We extracted data from each of the 163 studies (some of which included a single country

and some of which included multiple countries) to create a breakdown of policy studies for each individual country. If a study included, for example, four countries, it is listed under each of these four countries separately in Additional file 3, creating 635 country-specific policy analyses in total. The full-texts of 12 academic publications were not in English but in Chinese (*n*=2), Czech (*n*=2), French (*n*=2), Korean (*n*=1), Portuguese (*n*=2), and Spanish (*n*=3). These publications were translated into English for data extraction purposes. The selected studies investigated PA and/or SB policies in 168 out of 221 countries worldwide. From these studies, seven were focused exclusively on PA/SB guidelines. The large majority of studies (72%) focused only on one country, whilst the remaining 28% of studies compared or presented an overview of two or more countries. The key findings of the included studies for each of the 168 countries separately are summarised in Additional file 3, whilst international (non-country specific) findings are presented in Additional file 4.

Figure 7. Flow diagram of the search and study selection process



GoPA: Global Observatory for Physical Activity, WHO: World Health Organization

Active Healthy Kids Report Cards for Children and Youth or published articles based on the report card data comprised 40% of all the included studies. The Report Cards are developed under the Active Healthy Kids Global Alliance, a network of researchers, stakeholders, and health professionals (Active Healthy Kids, 2017). This large international project is based on a Canadian initiative that now includes 38 countries (Tremblay et al., 2016). Some countries like Canada, publish their Report Cards annually, but most other countries published them biennially. The Report Cards aim to assess how each country is performing in promoting and facilitating PA opportunities for children and youth (Colley et al., 2012). The common nine indicators incorporated in most countries' report cards are: (i) overall levels of PA; (ii) organized sport and PA; (iii) active play; (iv) active transportation; (v) SB; (vi) support from family and peers; (vii) school environment; (viii) community and the built environment; and (ix) government strategies and investments (Active Healthy Kids Global Alliance, 2017). A group of experts from each country responsible for the development of the report card assesses performance against each of the indicators and provides usually alphabetical grades for each indicator (from A to F and INC as *incomplete*). The key findings from the last indicator, that is, *Government's Strategies and Investments*, and the respective grade country experts assigned to their country are summarised in Additional file 3, whilst the joint findings and comparison of grades from the 2014 report cards (Tremblay et al., 2014) and the 2016 report cards (Tremblay et al., 2016) are summarised in Additional file 4.

A major contribution to worldwide PA policy monitoring was also provided by the GoPA (Ramirez Varela et al., 2017; Ramirez Varela et al., 2016). GoPA is a Council of the International Society of Physical Activity and Health (ISPAH), and was established to measure global progress in the area of PA research, surveillance, and policy (Ramirez Varela et al., 2017). GoPA collected data for 217 countries and confirmed data accuracy for 139 countries. For 53 countries, in our overall results, the only data included in the current review were from the GoPA country cards. GoPA developed PA country cards with six key indicators reported by key country informants: (i) general information on the country (including the Capital city, number of inhabitants, and life expectancy); (ii) PA prevalence among adults; (iii) health burden of insufficient PA (not meeting PA guidelines); (iv) existence of a national PA plan (yes/no); (v) information about PA surveillance (presence, year); and (vi) a

research output metric based on bibliographical assessment of published peer reviewed journal articles on PA. The fourth indicator on the availability of a national or subnational PA plan was extracted for the purpose of this review. GoPA provided descriptive data on PA policy for 139 countries, which constitutes 22% of all findings identified in this review.

We found some discrepancies in findings, especially for those countries that were analysed by multiple independent studies (see Additional file 3). Some of the possible reasons include: authors' subjectivity in assessment of the data; different methods used for analysing and obtaining the data; different interviewees involved in the study; and actual change in policy that occurred in the periods between studies.

4.3.2. Findings by regions and economic standard

Sixty-nine percent (*n*=438) of 635 country-specific policy analyses focused on high-income countries, out of which 63% (*n*=277) related to European Union (EU) member states (Figure 8). No studies were identified for ten out of 81 high-income countries: the Bahamas, the British Virgin Islands, Channel Islands, Curaçao, Gibraltar, Isle of Man, Lichtenstein, Saint Maarten (Dutch part), Taiwan, and Turks and Caicos Islands. For 23 high-income countries only one country-specific policy analysis was found; with most of those findings arising from the GoPA's *1st Physical Activity Almanac* (Ramirez Varela et al., 2016). Middle-income countries were investigated in 29% of country-specific policy analyses, and low-income countries in only 2%. For 21 out of a total of 31 low-income countries globally, and 22 out of 109 middle-income countries, no PA/SB studies were found (Figure 9). The most extensive policy review for low- and middle-income countries was performed by Lachat et al. (2013). They assessed the existence and content of governmental NCD, health, or nutrition policy documents from 83 WHO member states. However, the paper includes brief findings related to PA policies for only 35 countries. For 7% of all low- and middle-income countries presented in the current review - namely Cambodia, Djibouti, Jamaica, Madagascar, Mauritius, Niger, and the Philippines - findings on PA/SB policy were only available from the Lachat et al. (2013) paper.

Figure 8. Distribution of PA/SB policy research across countries by economic standard

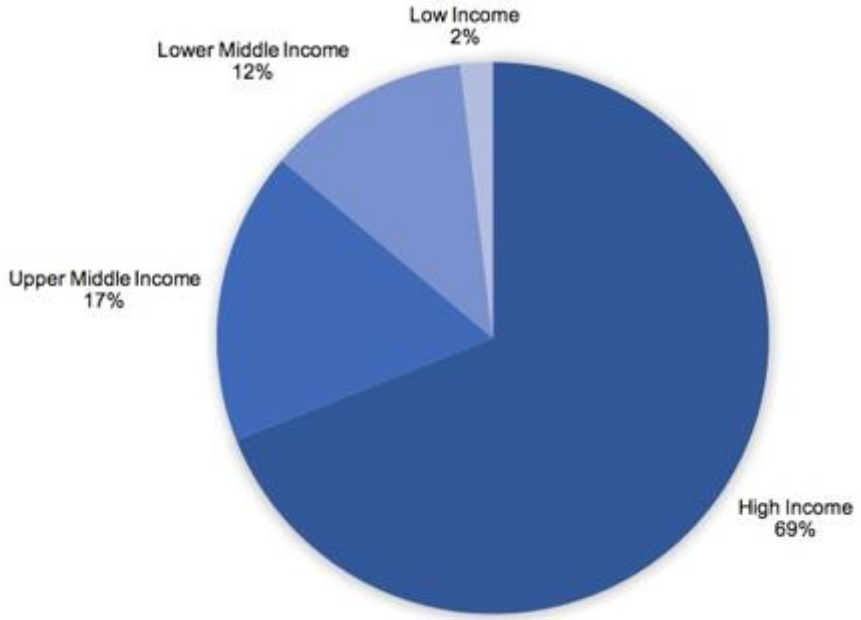
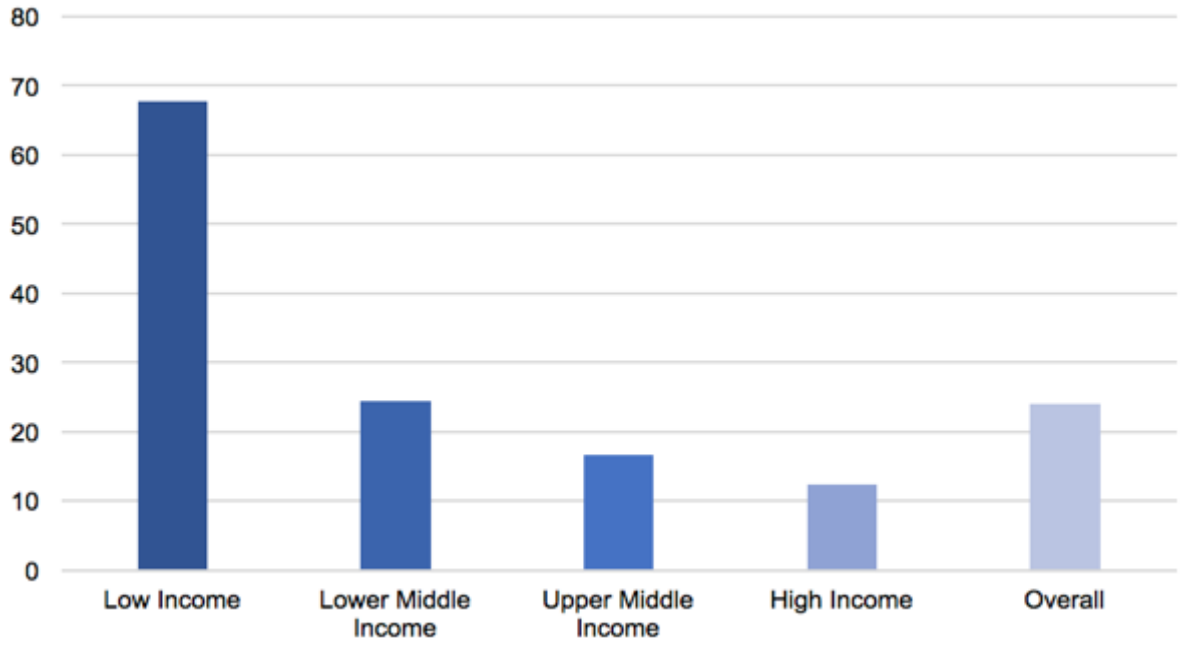


Figure 9. Percentage of countries with no available PA/SB policy studies; overall and by economic standard



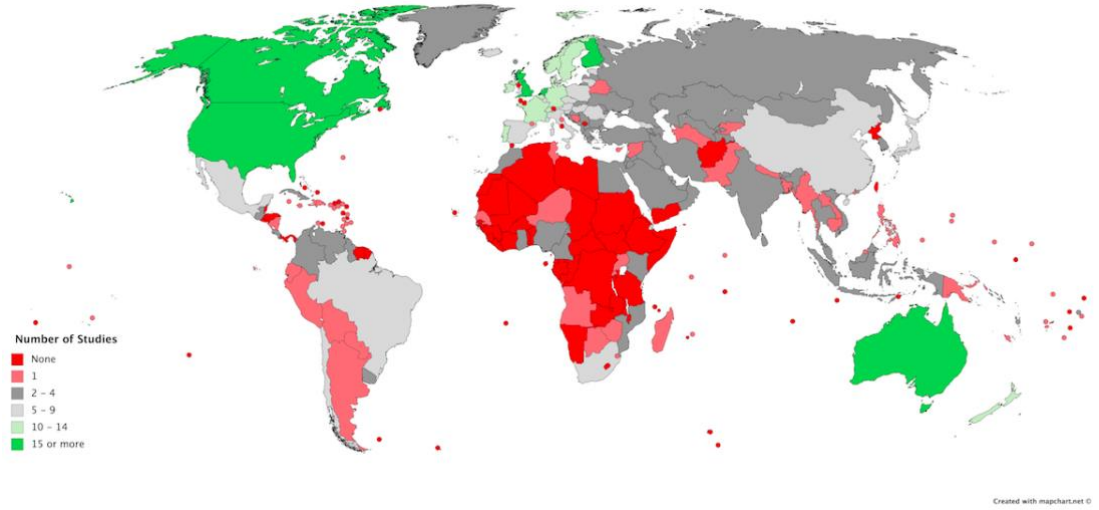
For 63 countries, only descriptive data, stating the existence and/or name of a policy document was found. More detailed analysis of PA related policies were available for Australia (Schöppe et al., 2004; Bellew et al., 2008), Brazil (Schöppe et al., 2004; da Silva, 2007), Canada (Schöppe et al., 2004; Craig, 2011; Wu, 2015), Chile (Salinas et al., 2003), England (Milton et al., 2015a), Finland (Schöppe et al., 2004; Bull et al., 2014d; Vuori et al., 2004; Seppälä et al., 2017), France (Prévot-Ledrich et al., 2016; Bréchat et al., 2009), Italy (Bull et al., 2014d), Mexico (Méndez, 2015), the Netherlands (Schöppe et al., 2004), New Zealand (Schöppe et al., 2004), Norway (Bull et al., 2014d), Portugal (Bull et al., 2014d), Scotland (Schöppe et al., 2004), Slovenia (Bull et al., 2014d), Switzerland (Schöppe et al., 2004; Bull et al., 2014d), and the USA (Guo et al., 2016). Analyses of sport or leisure policies that contain substantial information on PA policies were available for Canada (Bergsgard et al., 2007), Chile (Bravo et al., 2014), China (Lu et al., 2011; Tan, 2015), Cameroon (Clarke et al., 2017), Czech Republic (Kudláček et al., 2012), England (Bergsgard et al., 2007; Smith et al., 2016), Germany (Bergsgard et al., 2007), Malaysia (Aman, 2005), the Netherlands (Stuij et al., 2015), New Zealand (Aman, 2005; Piggin, 2008), Norway (Bergsgard et al., 2007; Skille et al., 2011), Portugal (Costa Januário et al., 2012), the UK (Green, 2009) (Murphy et al., 1998), and Vanuatu (Kobayashi et al., 2017) (Additional file 3).

Only 22% of included studies mentioned SB as part of policy, and just one recent study analysed policies related to SB independently of PA policies (Coenen et al., 2017). Specifically, mentions of SB related policies/guidelines were found in research for Australia (Schranz et al., 2016a), Belgium (Coenen et al., 2017), Canada (Tremblay et al., 2014), Finland (Seppälä et al., 2017), Hong Kong (Huang et al., 2016a), Ireland (Harrington et al., 2014a), Iceland (Kahlmeier et al., 2015), Malta (Kahlmeier et al., 2015), New Zealand (Maddison et al., 2016), Russia (Kahlmeier et al., 2015), Switzerland (Kahlmeier et al., 2015), and Sweden (Coenen et al., 2017) (Additional file 3).

The distribution of PA/SB policy research across countries is presented in Figure 10. England, Canada, and Finland have been researched the most. Brazil and Mexico were the most represented countries from the Latin American and Caribbean region. In this region, no data were found for Belize, El Salvador, French Guiana, Honduras, Panama, and Suriname. From Sub-Saharan Africa, the most data were available for South

Africa. However, Africa in general, both North and Sub-Saharan is the continent with least research found. From the Middle East, Yemen was the only country for which data were not found. The majority of research (55%) concerned European countries. For England, Finland, the Netherlands, and Scotland we found 15 or more studies. Most of the research was in regard to countries in Northern and Western Europe, with on average ten studies per country. Southern Europe had on average five studies per country and Eastern Europe four. From East Asia and Pacific region most data were found for Australia. China was the most researched Asian country.

Figure 10. The global distribution of physical activity and sedentary behaviour policy research



4.3.3. Conceptualisation of policy, frameworks and methods

A definition of policy, public policy, health policy, and/or PA policy was found in 13% of all included publications. A list of all definitions found in the publications is provided in Additional file 5 (Milton et al., 2015a; Bull et al., 2004a; Bellew et al., 2011; Daugbjerg et al., 2009; Schmid et al., 2006; Schöppe et al., 2004; Bellew et al., 2008; Christiansen et al., 2014; Rütten et al., 2012; Rütten et al., 2013; World Health Organization, 2011; Eyler, 2011; Lachat et al., 2013; Craig, 2011; Woods et al., 2012; Pratt et al., 2016; World Health Organization, 2010b; Pate et al., 2011; Seppälä et al., 2017; Brown et al., 2011; Active Healthy Kids Canada, 2012, 2013, 2014; Al-Bahlani et al., 2014; Bull et al., 2004c; Chimeddamba et al., 2015; Guo et al., 2016; Kalman et al., 2008; Méndez, 2015; Piggin, 2008; World Health Organization, 2010c, 2010d; Landes, 1991; Physical Activity Policy Research Network, 2017; World Health

Organization, 1998, 2017b; Rabotnikof, 2005; Meny & Thoenig, 1992; Jenkins, 1978). The most commonly used definition of PA policy was originally proposed by Bull et al. (Bull et al., 2004a). The conceptualisation of policy varied across studies and often even within the same study. Only 15% of the included studies used a conceptual or theoretical framework. Kingdon's Multiple Streams framework was used in four studies (Hämäläinen et al., 2015; Pratt et al., 2016; Milton et al., 2015b; Piggin et al., 2017). Elite theory (Tan, 2015), multilevel model of PA promotion (Rütten et al., 2013), figurational sociology (Stuij et al., 2015), institutional change theory (Gomez, 2015), the Theoretical Domains Framework, and the Behaviour Change Techniques Taxonomy (Seppälä et al., 2017) are among the other frameworks that were used. All four selected doctoral dissertations were based on conceptual/theoretical frameworks (Wu, 2015; Aman, 2005; Gillon, 2010; Piggin, 2008).

The included studies used a variety of methods for data collection and analysis of PA/SB policy (Additional file 2). All studies relied on some form of literature review. Expert review was used in 46% of the studies. Content analysis of documents was used in 6% of the studies. Interviews (mainly semi-structured) were used in 9% of the studies. Some studies combined both content analysis of interviews and content analysis of documents (Hämäläinen et al., 2016a; Hämäläinen et al., 2015; Hämäläinen et al., 2016b; Kudláček et al., 2012; Milton et al., 2015b). Interviews were combined with focus groups in two studies (Rütten et al., 2013; Kudláček et al., 2012), and a focus group was combined with content analysis of documents in one study (Coenen et al., 2017). Discourse analysis was used in 2% of the studies (Bell-Altenstad et al., 1995; Gillon, 2010; Lagos, 2016; Piggin, 2008), among which half also used interviews as their research method (Gillon, 2010; Piggin, 2008). A case study design was employed in 6% of the studies. A number of studies did not clearly specify their research methods.

4.4. Discussion

This is the first systematic scoping review of global PA/SB policy research. We found that PA policy research is much more developed than it was previously considered. However, there are few examples of policies that included SB. Three key issues were identified that should be addressed in further research: (i) there is a lack of PA/SB

policy research in low- and middle-income countries, which is an important limitation of the current body of evidence; (ii) the definition of policy varied significantly across studies, and most studies did not rely on any theoretical framework, which may impede cross-study comparisons; and (iii) studies have used a variety of methods to collect data and analyse policy, which may also cause problems with comparability. Each of these future research directions are discussed further below.

Different studies largely differed in their focus and aims. Accordingly, the depth of analysis varied significantly across studies. The studies that mainly focused on monitoring policies, such as Ramirez Varela et al. (2016), may be useful for providing a broad picture on PA policies globally. Studies that reviewed documents and their content in one region, such as Ceccarelli (2011) and Kahlmeier et al. (2015), can serve as a comparative overview of best practices and a good starting point for further research and more elaborated analyses of national policy. Detailed comparative studies on policies in a few countries, such as Bergsgard et al. (2007), may be useful for understanding why some countries are more successful in PA promotion than others. Studies that critically assess PA policy in a single country, for example Milton and Bauman study for England (2015a) and Craig for Canada (2011), may be useful for researchers and policy makers interested in the country's policy situation and possible ways of improving it. Studies focusing on detailed assessment of one policy document, such as Pérez-Escamilla (2016), may provide grounds for improving the documents and may be useful for informing the development of similar policy documents in other countries.

4.4.1. Towards more research in low and middle-income countries

Most research was conducted to analyse PA/SB policies in high-income countries, whilst low- and middle-income countries are significantly underrepresented within PA/SB policy research. Most available findings for low- and middle-income countries are provided in the GoPA's *1st Physical Activity Almanac*; hence this publication can be considered an important contribution to the development of PA policy research in these countries. For 17 high-income countries and 36 low- and middle-income countries, the only data we found were from GoPA country cards. Thus the country cards might be considered an important starting point for guiding PA policy

developments in countries around the world. However, they merely include a statement about the availability (Yes/No) of the national or subnational PA plan (*n*=47), the inclusion of PA within a broader NCD policy (*n*=16), and the name of the available policy document (*n*=76) as opposed to a detailed analysis of PA/SB policy status.

Another important study providing data for low- and middle-income was a review conducted by Lachat et al. (2013), where PA/SB policies were analysed in the broader context of NCD prevention, together with nutrition-related policies. However, due to the fact that this study had a wider scope, only limited data were provided specifically on PA/SB policy. Policy actions and targets related to PA promotion were extracted from the respective documents, so unlike GoPA's country cards, this study reports on some specific content of the policy documents. However, this review (Lachat et al., 2013) provided no references for the reviewed policy document for Costa Rica, Madagascar, Guatemala, Solomon Islands, and Djibouti, which may limit the usability of their findings in future research on PA/SB policies in these countries. Another limitation of this review is that, while reporting on whether inactive lifestyle was discussed within policy documents, it did not distinguish between SB (nowadays defined as prolonged sitting) and inactive lifestyle (traditionally defined as lack of PA). This may cause confusion between the two concepts that the current epidemiological research clearly differentiates (Tremblay et al., 2017). Clearly, more studies comprehensively reviewing PA and SB policies in low- and middle-income countries are needed.

General information on national PA/SB policies can also be found in studies from other sectors, for example NCD prevention (World Health Organization, 2014b; Alwan et al., 2001; World Health Organization, 2007a, 2012, 2016). However, the depth of information they provide on PA/SB policies is often limited, as these policies are not in their main focus.

Furthermore, for large high-income countries, such as Canada, USA and Australia, a number of studies that analysed subnational (that is state, territorial, provincial, municipal, regional or local PA policies) were identified during the study selection process. For example, in the USA, a number of studies related to school district PA policies were found. Such studies may provide very useful information for PA/SB

policy development at a local level and should, therefore, continue to be conducted in countries of both higher and lower economic standard. A separate scoping review of subnational PA/SB policy research is warranted as a systematic assessment of studies on this topic was beyond the scope of the current paper.

Taking into account that, for 53 countries around the world, no PA/SB policy studies were found, continued efforts in PA/SB policy development and research are needed. However, this might also be due to language restrictions, as this review included only studies with titles and abstracts in the English language. Further research should pay special attention to the low- and middle-income countries and those high-income countries with little or no available data.

4.4.2. Towards a standardised conceptualisation of PA/SB related policies

Policy was differently conceptualised across different studies. In 2006, Schmid et al. wrote that "public health policy around PA remains poorly defined and developed" (Schmid et al., 2006, p. 20). Given that only 10% of the selected studies were published before the Schmid et al. paper, the statement about the poor development of PA policy may not be true anymore. However, taking into account the issues with defining and conceptualising PA and SB policy across the studies included in this review, the Schmid et al. statement about the generally poor definition of PA policy remains valid. Schmid et al. conceptualised policy, reflecting political and social commitment, at three levels: (i) formal written codes, regulations or decisions holding legal authority; (ii) written standards that guide choices; and (iii) unwritten social norms that impact behaviours (Schmid et al., 2006). Among the currently reviewed studies that provided an operational definition of policy, the vast majority conceptualised it within the Schmid et al.'s first level. Many studies relied on the definition of policy provided by Daugbjerg et al. that conceptualises 'policy' as a 'policy document', that is a "written document that contains strategies and priorities, defines goals and objectives, and is issued by a part of the administration" (2009, p. 806). This definition was later used as the working definition in the WHO and the European Commission in their joint reports of the National Information Focal Points meetings (World Health Organization, 2010c). Rütten et al. for example stated that their approach is grounded on a broader definition of policy than the one proposed by the WHO, which also includes informal

institutional procedures, arrangements and rationales for action on health- related issues (2013). The most often used definition of PA policy was proposed by Bull et al., which defines it as a "formal statement that defines physical activity as a priority area, states specific population targets and provides a specific plan or framework for action" (Bull et al., 2004a, p. 92). In most cases, studies focused only on public sector policies, that is, "governmental statements", whilst somewhat less often they also included written statements of NGOs, international organisations, and professional bodies. Some studies, such as Christiansen et al. (2014) and Daugbjerg et al. (2009) clearly distinguished between policy and other documents such as strategies, action plans, and guidelines. These two studies as well as Al-Bahlani and Mabry (2014) made a distinction between policies and legislation. Unlike, for example Coenen et al. (2017) who under the category "policy documents" included guidelines, legislation, directives, and codes of practices. Seppälä et al. (2017) under "policy papers" also included guidelines, good practice guides, strategies, and action plans. A number of studies did not clearly differentiate between interventions, policies, and policy actions. Some studies, such as Milton and Bauman (2015a) conceptualised PA policy more comprehensively and considered national recommendations on PA levels, national targets and goals related to PA, public education on PA, and PA surveillance and monitoring as key aspects of national PA policy, whilst others, such as Pate et al. (2011) defined it more narrowly as formal written documents providing guidelines on public PA promotion.

Various understandings and conceptualisations of PA policy within and between studies may create confusion within the field and negatively affect comparability of findings, but may also be part of an evolutionary process of reaching a consensus on what PA policy is. However, political scientists have agreed there is likely never to be a universal definition of policy. Policy is a flexible concept used differently in different contexts and on different occasions. It is a "continuing process of social action and interaction" and there are a lot of different ways in which people perceive or perform policy (Colebatch, 2002, p. 13). Using the term "policy" in different ways across different contexts is not necessarily a problem (Colebatch, 2002, p. 7). However, we believe defining it within every specific academic discourse can be beneficial and would significantly contribute to the reduction of analytical weaknesses present in

some PA/SB policy studies that, by not providing a clear operational definition of policy, often fail to properly define their object of policy analysis.

The conceptualisation of PA/SB policy depends also on the definition of PA and SB. Even though scientific consensus seems to have been achieved (Tremblay et al., 2017), PA is still often confused with sport, physical fitness, and exercise. The inconsistency regarding the definition of SB is even larger, probably because SB research is a much younger field than PA epidemiology. The interchangeable use of the terms 'physical inactivity', 'sedentary lifestyle', 'screen-time', and 'sedentary behaviour' is still very common among scholars (Pedišić, 2014). The Sedentary Behaviour Research Network (SBRN) initiated the *Terminology Consensus Project* and suggested definitions of several terms related to SB (Tremblay et al., 2017); yet definitions of some common terms, such as "sedentary lifestyle", have still not been clarified (Tremblay et al., 2017).

Finally, only 15% of the PA/SB policy studies relied on theoretical or conceptual frameworks to support their analyses. It is evident that PA/SB policy research should be more grounded in existing frameworks. For example, in 2006, Schmid et al. developed the *Framework for PA Policy Research*. Although this framework was mentioned in several studies (Bellew et al., 2011; Daugbjerg et al., 2009; Christiansen et al., 2014; Rütten et al., 2013; Eyler, 2011; Woods et al., 2012; Wu, 2015; Pratt et al., 2016), only two studies based its content analysis grid on this framework (Daugbjerg et al., 2009; Christiansen et al., 2014). Using some of many available theories, frameworks, methods, and concepts available from political science and other established disciplines could positively contribute to the further improvement and standardisation of PA/SB policy research. It should be noted, however, that the diversity of approaches and definitions may sometimes be considered desirable, especially in young fields of research. Advancing to standardisation too soon might hinder the development and exploration of some potentially useful approaches.

4.4.3. Towards a standardised policy analysis

The so-called "policy science" and its main component, policy analysis, have been developing since the 1950s when Harold Lasswell's seminal book *The Policy Sciences – Recent Developments in Scope and Method* was published (1951). However, due to

the lack of a universally accepted definition of policy, there is also no universally accepted method to perform policy analysis. This review revealed that the methods used for PA/SB policy research are far from being standardised and that the form of research outputs in this area largely depended on individual approaches. The sage words of the authors of *The Australian Policy Handbook*: "Policy analysis is a balance between art and science." (Althaus et al., 2013, p. 7) can, therefore, also be applied to research analysing PA/SB policies. While some claim there is no difference between policy analysis, policy assessment, and policy evaluation, some made guidelines on how each one of these should be performed and differentiated from the others (Morestin, 2012; HM Treasury, 2011). Policy analysis as a *craft* "draws on intuition as much as on method" (Bardach et al., 2015, p. xvi). Considering that PA/SB policy research is at least 40 years younger than "policy science", it is understandable that it still draws more on intuition than on method. This notion is grounded in the fact that most of the studies included in this review did not rely on specific, conventional policy research methods but usually on narrative literature reviews and expert reviews.

The challenges in policy analysis were clearly outlined in some reviewed studies. For example, the Active Healthy Kids Report Card's indicator titled *Government Strategies and Investments* was assessed against three benchmarks: (i) "evidence of leadership and commitment in providing physical activity opportunities for all children and youth"; (ii) "allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth"; and (iii) "demonstrated progress through the key stages of public policy making (i.e., policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future)" (Tremblay et al., 2016, p. S345). However, this indicator has been reported as "difficult to grade" (Tremblay et al., 2014, p. S120). In the first comparative 'Global Matrix' of grades from 2014, one-third of the countries did not grade this indicator and marked it as incomplete (Tremblay et al., 2014). In the second 'Global Matrix' it was reported that only six out of 38 countries marked this indicator as incomplete (Tremblay et al., 2016). Even though the number of countries that assigned grades was higher in the second matrix than in the first one, several Report Cards stated that this indicator is one of the hardest to grade. Some of the reported reasons were: a lack of agreed assessment criteria (Maddison et al., 2014; Maddison et al., 2016) or specific international recommendations (Wijtzes et al., 2016b); no well-founded and clear criteria or

benchmarks to outline which amount of investments is acceptable or which policy is effective (Burghard et al., 2016a); and the perception that the Report Cards are not fit for policy evaluation purposes (Harrington et al., 2016b). In the results from Qatar's Report Card, it was stated that the grade was assigned "as in most countries" based on the "presence" of national investments and strategies related to children and youth's health and PA (Al-Kuwari et al., 2016a). This may not be considered the most informative approach to PA/SB policy analysis.

To support standardised analysis of national policy approaches to PA, the HEPA Europe expert group developed a comprehensive instrument entitled *Health Enhancing Physical Activity Policy Audit Tool* (HEPA PAT) (Bull et al., 2014a; Bull et al., 2014b), structured around 17 key elements for a successful national approach to PA promotion. Prior to its development, there was no "standardised instrument to capture the relevant policy information in a standardised way or to collate more in-depth data" (Bull et al., 2014a, p. 234). HEPA PAT is one of the rare tools that, in addition to PA, also informs on SB policies. The protocol recommends that PAT is completed using a collaborative process and involving multiple sectors. It suggests that responses from all relevant sectors are collected and reviewed collectively and that the process of completion itself can support and strengthen policy development. However, the early experiences of countries developing the HEPA PAT found that between three and six months are needed to complete the whole process (Bull et al., 2015) which is probably the main reason why since its development it has only been used in three other studies (World Health Organization, 2014a; Prévot-Ledrich et al., 2016; Kahlmeier, Milton, Cavill, Giné-Garriga, Galán-Mercant et al., 2017). There are, however, promising ongoing initiatives that will likely ensure the implementation of HEPA PAT in more countries internationally. It is also important to mention that the primary purpose of HEPA PAT is limited to policy audit and therefore, it cannot be used for the policy assessment (or grading as in the case of the Active Healthy Kids Report Cards). There seems to be a need for the development of a tool which would allow for rating or assessment of the success and progress of national policies related to PA/SB (Bull et al., 2014a). More coordinated work on a standardised approach to international analysis of PA/SB policies would significantly contribute to the further development of this research area.

4.5. Strengths and limitations of the review

The key strengths of the current review include: (i) the search was conducted through a range of bibliographic databases, reference lists of included articles, and relevant websites, which reduced the likelihood of missing relevant publications; (ii) we used an inclusive search syntax and broad eligibility criteria that allowed us to identify and include relevant studies on a wide range of PA/SB policy topics; (iii) the assessment of eligibility of studies was done in duplicate, which reduced the likelihood of bias in study selection; (iv) we clearly stated the definitions of policy and policy analysis used for the purpose of this review; and (v) full-texts of 12 publications were translated from their original languages into English to allow for data extraction.

This review is subject to some limitations. Firstly, although the literature search was done with no language restrictions, we were able to include only publications with titles and abstracts in English. This may have resulted in the omission of some relevant publications. It should be noted, however, that we included 12 publications with full-texts in languages other than English. Secondly, we did not conduct a formal assessment of study and evidence quality. This was not possible to be done in a systematic fashion, because the included studies were conducted using a wide variety of study designs and methods. Nevertheless, based on the extracted data, we provided a general assessment of the overall completeness of evidence. Finally, we did not conduct an in-depth analysis of PA/SB policies for each specific country. Although such an analysis would be of great value for future research and policy initiatives, it was beyond the scope of this review. Nevertheless, we summarised findings of the included studies for a total of 168 countries.

4.6. Conclusion

The results of this systematic scoping review show that PA policy research is much more developed than it was considered several years ago. Research around SB policies is still in its infancy, but it seems to have experienced some positive progress in the last few years. There are still a large number of countries with no or very little research on PA/SB policy, particularly among those with low or middle income. Increased efforts should be made to include such countries into academic discussion on PA/SB policy. Future PA/SB policy studies should also aim towards a clearer conceptualisation of

policy, greater reliance on existing theoretical frameworks, and the use and further development of standardised methods for PA/SB policy analysis.

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DECLARATION OF CO-AUTHORSHIP AND CO-CONTRIBUTION: PAPERS INCORPORATED IN THESIS

This declaration is to be completed for each conjointly authored publication and placed at the beginning of the thesis chapter in which the publication appears.

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3. CO-AUTHOR(S) DECLARATION

In the case of the above publication, the following authors contributed to the work as follows:

The undersigned certify that:

1. They meet criteria for authorship in that they have participated in the conception, execution or interpretation of at least that part of the publication in their field of expertise;
2. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

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3. There are no other authors of the publication according to these criteria;
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Grant O'Sullivan	3.5	participated in the open discussion, 3 rounds of Delphi process and reading, writing and approving the manuscript	[redacted]	13/09/2019
Karen Milton (supervisor)	3.5	participated in the open discussion, 3 rounds of Delphi process and reading, writing and approving the manuscript		18/10/2019
Stuart J.H. Biddle (supervisor)	3.5	participated in the open discussion, 3 round of Delphi process and reading, writing and approving the manuscript		22/10/2019
Adrian Bauman	1.5	participated in the consultation process and reading, writing and approving the manuscript		13/09/2019
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Catherine Woods	1.5	participated in the consultation process and reading, writing and approving the manuscript		29/05/2020
Zeljko Pedisic (principal supervisor and corresponding author)	8	contributed to the overall idea, study conceptualisation, Delphi methodology, the framework development and design		22/09/2019

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5. The development of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) Framework[2]

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Abstract

Background: Policy analysis is considered essential for achieving successful reforms in health promotion and public health. The only framework for physical activity (PA) policy analysis was developed at a time when the field of PA policy research was in its early stages. PA policy research has since grown, and our understanding of what elements need to be included in a comprehensive analysis of PA policy is now more refined. This study developed a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework.

Methods: The development of the CAPPA framework was based on: (i) an extensive review of literature; (ii) an open discussion between the authors; (iii) three rounds of a Delphi process; and (iv) two-rounds of consultations with PA policy stakeholders.

Results: The CAPPA framework specifies 38 elements of a comprehensive analysis of PA policies in the following six categories, which comprise the building blocks of the framework: (i) *purpose of analysis* (including auditing and assessment of policies); (ii) *policy level* (including: international; national; subnational; local; and institutional policies); (iii) *policy sector* (including: health; sport; recreation and leisure; education; transport; environment; urban/rural planning and design; tourism; work and employment; public finance; and research sectors); (iv) *type of policy* (including: formal written policies; unwritten formal statements; written standards and guidelines; formal procedures; and informal policies); (v) *stage of policy cycle* (including: agenda setting; formulation; endorsement/legitimisation; implementation; evaluation; maintenance; termination; and succession); and (vi) *scope of analysis* (including availability; context; processes; actors; political will; content; and effects). Based on the CAPPA framework, we also proposed broad and inclusive definitions of PA policy and PA policy analysis.

Conclusion: The CAPPA framework may be used to guide future studies related to PA policy and to provide a context for the analysis of its specific components. The framework could be used in the same way for sedentary behaviour policy research. Future research should examine the extent to which PA policy analysis has covered each of the elements specified in the CAPPA framework and analyse the elements for which evidence is lacking. Future studies should also determine whether the existing tools allow for auditing and assessment of all the CAPPA elements and develop new tools if needed to allow for a more comprehensive PA policy analysis.

Key words: Physical activity, Policy, Policy analysis, Sedentary behaviour, Framework

5.1. Background

Insufficient physical activity (PA) is among the key risk factors for non-communicable diseases (NCDs), such as type II diabetes, some types of cancer, and cardiovascular disease (Lee et al., 2012; Physical Activity Guidelines Advisory Committee, 2018). NCDs cause the deaths of nearly 40 million people per year world-wide, which is around 70% of overall global mortality (World Health Organization, 2018d). Accordingly, insufficient PA is considered one of the main risk factors for premature mortality worldwide (World Health Organization, 2018e). For example, in 2008, approximately 9% of all deaths globally were attributed to insufficient PA (de Rezende et al., 2016). Insufficient PA is also associated with a range of poor mental health outcomes, such as increased risk of depression (Lee et al., 2012). Current inadequate PA levels also generate a significant economic burden for national healthcare systems. Conservatively estimated, physical inactivity costs healthcare systems worldwide around 53.8 billion international dollars, of which 68% is paid by the public sector (Ding et al., 2016). Given these large health and economic impacts, investing in PA promotion is widely considered a "best buy" (Physical Activity Guidelines Advisory Committee, 2018; MacAuley, Bauman, & Frémont, 2016). The significant public health and economic burdens of insufficient PA also emphasise the need for good public health policy related to PA.

In the last two decades, several important events have contributed to PA planning and policy development (Kohl et al., 2012). One of the initial global-level policy developments in PA promotion occurred in 2004 when the World Health Organization (WHO) issued the *Global Strategy on Diet, Physical Activity and Health* (World Health Organization, 2004). Subsequently, in 2013, the WHO published the *Global Action Plan for the Prevention and Control of NCDs* (World Health Organization, 2013). In this document, national governments, as key players in the prevention and control of NCDs, are urged to: establish national NCD targets; develop national NCD plans; and measure their progress in tackling NCDs (World Health Organization, 2013). The plan provides a menu of policy options for governments and other stakeholders to take action in NCD control and prevention and includes a global target to reduce the prevalence of insufficient PA by 10% by 2025 (World Health Organization, 2013). In

2018, the WHO launched a *Global Action Plan on Physical Activity* which recommends 20 policy actions (World Health Organization, 2018b) and is currently preparing a monitoring framework that will provide member states with methods to appraise progress related to PA policy development. One of the key recommended actions to support the creation of active systems is strengthening of policy frameworks, governance, and leadership systems at both subnational and national levels, to encourage implementation of actions to increase PA (World Health Organization, 2018b).

Increasing PA in a population requires culturally adapted, large-scale actions across whole systems, including multiple contexts, such as the health, transport, sport, urban planning and education sectors (World Health Organization, 2018b; Bull et al., 2014a). As such, one of the essential determinants of active living is the policy environment (Sallis et al., 2006). The development and implementation of policies may facilitate the creation of supportive environments for people to engage in physically active lifestyles (Bellew et al., 2011; World Health Organization, 2017a). Therefore, a vital platform for developing, managing, and providing such actions is a national-level policy (Bull et al., 2014a). By developing and implementing PA policies, national governments design political and legal frameworks that are necessary for local governments and municipalities to create opportunities and environments for PA and active living (World Health Organization, Regional Office for Europe, 2018).

It has been suggested that further research is needed to better inform future PA policy development (Kohl et al., 2012; Schmid et al., 2006; Rütten et al., 2016). Understanding the policy process and impact is essential for facilitating successful reforms (Walt et al., 1994). A valuable tool enabling evidence-based development and improvement of policies is *policy analysis*, a "craft" that has been evolving since the 1950s (Bardach et al., 2015, p. xvi; Lasswell et al., 1951). Policy analysis is perceived as crucial to achieving successful reforms in health promotion (Walt et al., 1994). In relation to PA promotion, an analysis of PA-related policies can: raise awareness of current policy gaps and opportunities; demonstrate policy related actions being taken across the system; encourage important debates; contribute to meeting health objectives (Buse et al., 2009); provide a catalyst for cooperation and communications

across different sectors and levels (Bull et al., 2014a); and assist decision makers in making better informed choices in a specific problem situation (Quade et al., 1989).

In a recent systematic review, Klepac Pogrmilovic et al. (2018) found more than 150 studies on national-level PA policies, which suggests that this research field is relatively well developed. However, the review also found that very few studies relied on explicit and rigorous conceptual or theoretical frameworks, which may have led to vague and/or varied definitions and conceptualisations of PA policy. The review also found that researchers in this area have not reached consensus on the definitions of PA policy and PA policy analysis (Klepac Pogrmilovic et al., 2018). Taking this into account, Klepac Pogrmilovic et al. (2018) suggested that more coordinated efforts on a standardised approach to PA policy analysis would contribute to further advancement of this research area.

In 2002, a major consultation on PA policy development took place between the WHO and the United States Centers for Disease Control and Prevention (Shephard et al., 2004), from which a PA policy framework was recommended. The framework addressed the necessary elements that PA policy needs to encompass (Shephard et al., 2004). The first and only framework designed specifically for PA policy research was developed by Schmid and colleagues in 2006 to improve categorisation, visualisation, and understanding of PA policy research. The Schmid et al.'s framework (2006) is presented as a figure with three 'axes': *policy*, *sector*, and *scale*. The most important axis is the vertical one which presents different ways in which policy may be studied: identifying policies (i.e. description), determinants of policy, developing and implementing policy, and the impacts of policies (Schmid et al., 2006). The remaining two axes are: the *sector* axis (including: health; transportation; parks/public spaces; worksite; and school sectors) and the *levels* axis (including: local; regional; state; national; and international policies) (Schmid et al., 2006). It furthermore conceptualises public policy at three levels as: formal written codes; written standards; and unwritten social norms. The framework was developed through four stages: a literature review; a review of other policy research frameworks; collaborative discussions; and three workshops.

Schmid et al.'s framework (2006) was developed at a time when the field of PA policy research was in its early stages and it provided a useful foundation for several studies undertaken in the field (Bellew et al., 2011; Daugbjerg et al., 2009; Christiansen et al., 2014; Rütten et al., 2013; Eyler, 2011; Woods et al., 2012; Wu, 2015; Pratt et al., 2016). However, PA policy research has since grown as a research area (Ramirez Varela et al., 2018a; Klepac Pogrmilovic et al., 2018), and our understanding of what elements need to be included in a comprehensive analysis of PA policy is now more refined. For example, the scope of Schmid et al.'s framework (2006) does not cover formal processes and unwritten formal statements. Also, it is focused primarily on public policies, with less emphasis on non-governmental policies (e.g. private sector policies) related to PA. Furthermore, the framework does not: aim to provide a platform to facilitate a specific policy analysis; take into account all stages of the policy cycle at which policies may need to be studied; or acknowledge that PA policy analysis may be focused on various aspects, such as the content of a policy, the context surrounding a policy, or the actors involved in the development of a policy. Therefore, a more comprehensive framework is needed to reflect this evolving and diversifying field and to better guide contemporary and future PA policy research.

Applying a comprehensive approach to PA policy, with a focus on analysis, may strengthen the evidence base on PA policy development and content, improve comparability between studies, and provide insight into why some countries, institutions, and agencies are more successful in developing enabling contexts within which PA promotion is more likely to happen and achieve real impact. The aim of this paper was to develop a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework.

5.2. Methods

The development of the CAPPA framework was based on: (i) an extensive review of literature; (ii) an open discussion between the authors; (iii) three rounds of a Delphi process; and (iv) two rounds of consultations with ten PA policy stakeholders. The development of the framework is depicted in Figure 11. We conducted a systematic literature review to identify studies that analysed national PA and/or SB policies (Klepac Pogrmilovic et al., 2018). By reviewing the content of 203 publications included in the review, we found 25 studies that relied on a theoretical or conceptual

framework. For the current study, we reviewed the frameworks cited in these studies. Additionally, we conducted an extensive search of the literature on theoretical and conceptual frameworks used for the analysis of other PA policies (not national) and other public health policies. The search was conducted through reference lists of all identified articles in the systematic literature review, authors' own archives and the Google Scholar database. The initial draft of the CAPPA framework was developed by two authors (BKP and ZP) through a discussion based on the theoretical models and concepts presented in the existing literature related to policy analysis in general (Dye, 2013; Althaus et al., 2013; Dunn, 2004; Kustec-Lipicer, 2012; Fischer et al., 2007; Bardach et al., 2015; Colebatch, 2005; Cairney, 2012; Lasswell et al., 1951) and policy analysis within the health and PA research field (Milton et al., 2015a; Bull et al., 2014a; Daugbjerg et al., 2009; Schmid et al., 2006; Walt, 1996; Christiansen et al., 2014; Rütten et al., 2012; World Health Organization, 2015; Centers for Disease Control and Prevention US Department of Health and Human Services, 2013).

The first draft of the framework was revised on the basis of written comments provided by three authors (GOS, KM, and SJHB) and an open discussion between five of the authors (BKP, GOS, KM, SJHB, and ZP). These five authors were selected purposefully, as each one of them had specific academic expertise important for the development of the framework, including political science (BKP), psychology and qualitative methods (GOS), PA policy analysis (KM), epidemiology of PA and SB (SJHB), and methods and measurement in public health (ZP). The second draft of the framework was further considered by these authors, through a three-staged Delphi decisional process. The purpose of the Delphi process was to: (i) get independent suggestions from the panel members about how to improve the second draft of the framework; and (ii) achieve consensus about the draft framework. The Delphi method was employed to ensure anonymity in the process of reaching consensus on the structure and wording of the draft framework.

The Delphi method is a systematic approach to reaching consensus, through interactive communication among experts (Dalkey & Helmer, 1963). The Delphi methodology is often used in PA policy research (Aro et al., 2016; Aarts et al., 2011; Valente, Castellani, Larsen, & Aro, 2015) as well as within the field of PA research in general (Gillis et al., 2013). Various tools may be employed to administer a Delphi process

(Gill et al., 2013; Stevenson, 2010). For the current study, the panel members provided information by completing online surveys. An independent researcher outside the author team and the Delphi panel acted as the moderator for the Delphi process. Before starting each round, the moderator distributed to the panel members an email invitation containing the survey web link and a supplementary file with a detailed explanation of the draft structure of the framework and the definitions of the building blocks of the framework and their elements. After each round, the moderator collected the responses and provided feedback to the panel members. The feedback included summary comments related to each section of the survey as well as anonymised individual responses provided by all panel members.

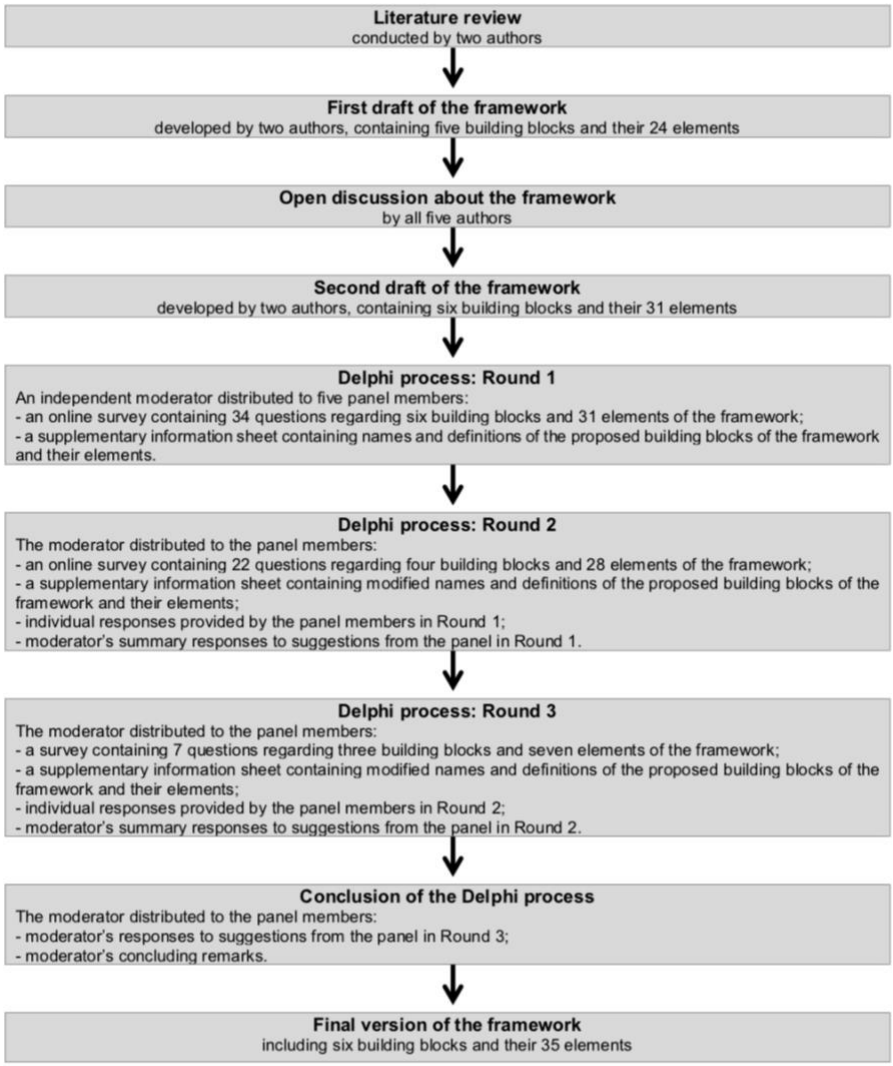
The first round of the Delphi process covered three key areas: (i) name of the framework; (ii) overall structure of the framework; and (iii) the names and the definitions of all proposed building blocks of the framework and their respective elements. A combination of closed and open-ended questions was used in the survey for each specific section of the framework. For example, in the section of the survey related to the category "purpose of analysis", these questions were posed: (i) "Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the 'Purpose of analysis' category? (closed "yes/no" response); (ii) "If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?" (open-ended response); (iii) "Do you think any other elements should be added to this category of the framework?" (closed "yes/no" response); and (iv) "If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added" (open-ended response).

The third draft of the framework, developed in the Delphi process, was then revised through two-rounds of consultations with ten PA stakeholders, authors of the paper (AB, ARV, CW, HR, MK, MP, NC, NM, SK, and WB), who were asked to provide their written comments on the building blocks and elements of the framework and their definitions. The members of the consultation panel were selected purposefully, where the criteria for their inclusion in the panel were: (i) they have participated in the development of PA policy; and/or (ii) they are experts in PA policy research. Expertise of the consultation panel members relevant to the development of the framework

included: development, implementation, and evaluation of PA policies and programmes; PA surveillance and monitoring; development of PA guidelines; PA interventions; public policy; and building international and global public health capacity. The consultation panel members were selected from various contexts, such as public policy, academia, national and international organisations for PA promotion, and public health consultancy. The comments on the third and pre-final draft of the framework made by the members of the consultation panel were discussed among all fifteen authors, which led to the development of the final version of the framework.

In this paper we relied on the broad and common definition of the term "policy analysis" that is "Policy analysis is any form of policy-relevant research" (Hird, 2017, p. 44). Based on the literature review and the CAPPA framework, herein we proposed definitions of PA policy and PA policy analysis that are aligned with a comprehensive approach to analysing PA policies.

Figure 11. Summary of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework development



5.3. Results

The first draft of the framework, developed through the literature review and collaborative discussions of two authors, contained five categories (i.e. building blocks of the framework): purpose; level; sectors; type of policy; and aspect of policy and their 24 elements. The framework was modified after an open discussion and extensive comments from the remaining authors. The second draft of the framework contained six building blocks of the framework (purpose of analysis; policy level; policy sector; type of policy; stage of policy cycle; and scope of analysis) and their 31 elements. The second draft of the framework was then refined through the Delphi process. During the three rounds, panel members reached consensus on more than 40 discussion points, while the final decision on two discussion points was made by a four-fifths supermajority vote. The Delphi panel agreed on the inclusion and definitions of six building blocks of the framework and their 35 individual elements. The final version of the framework was developed through two rounds of consultations with ten PA policy stakeholders. The consultation panel members made a total of 43 suggestions. Based on the suggestions and following a discussion between all authors of the paper, 32 final changes were made to the framework. This included: (i) changing the names of four elements of the framework; (ii) modification of fifteen definitions; (iii) adding two additional elements to the framework; (iv) dividing one element into two elements; and (v) refining the examples provided for ten elements.

The final CAPPA framework (Figure 12) specifies 38 elements of a comprehensive analysis of PA policies in the following six categories (i.e. building blocks of the framework): purpose of analysis (including: auditing and assessment of policies); policy level (including: international; national; subnational; local; and institutional policies); policy sector (including: health; sport; recreation and leisure; education; transport; environment; urban/rural planning and design; tourism; work and employment; public finance; and research sectors); type of policy (including: formal written policies; unwritten formal statements; written standards and guidelines; formal procedures; and informal policies); stage of policy cycle (including: agenda setting; formulation; endorsement/legitimisation; implementation; evaluation; maintenance; termination; and succession); and scope of analysis (including: availability; context; processes; actors; political will; content; and effects). In Table 2, we provide the

definitions of the building blocks and elements of the framework, together with examples that may facilitate their understanding.

Figure 12. Structure of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework

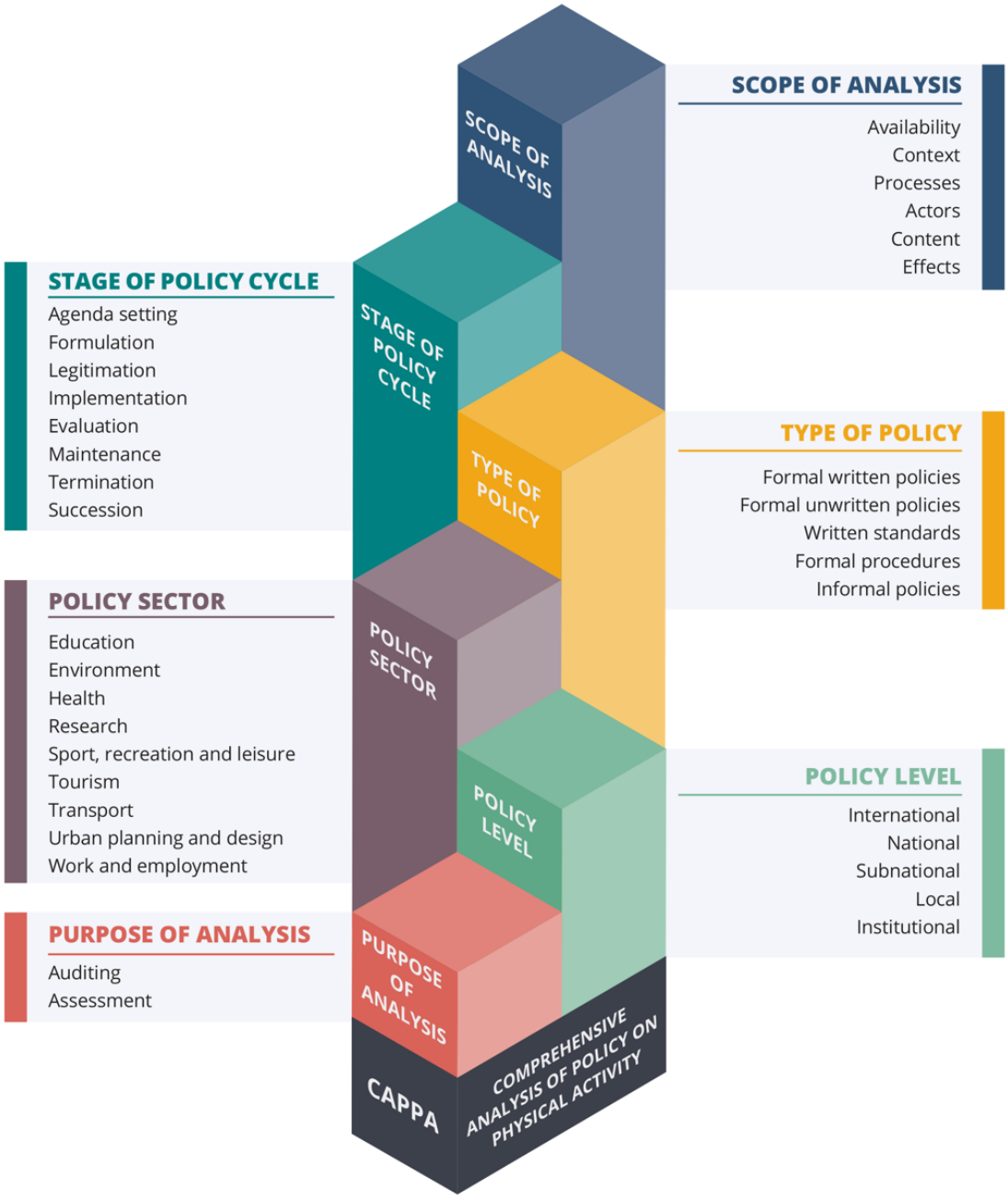


Table 2. Definitions of the building blocks and elements of *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework

Term	Definition, explanation and/or example
PURPOSE OF ANALYSIS	The purpose of a policy analysis
Auditing	Inquiry about a certain aspect of policy but not rating, grading, judging, or evaluating it. An example of a questionnaire item used for this purpose is: "Does Australia have a national PA strategy?".
Assessment	Grading, rating, judging, or evaluating policy. An example of a questionnaire item used for this purpose is: "On the scale from 1 to 10, please rate to what extent is the Australian PA strategy evidence-based?".
POLICY LEVEL	The level on which a policy was enacted and/or implemented
International	Policy that was enacted, endorsed, and/or implemented by an international political body (e.g. a policy of the United Nations).
National	Policy that was enacted, endorsed, and/or implemented by the national government or a governmental body (e.g. a policy of the Australian national government).
Subnational	Policy that was enacted, endorsed, and/or implemented below the national level but above the local level (e.g. a policy of the state government of Victoria, Australia).
Local	Policy that was enacted, endorsed, and/or implemented by a local government (e.g. a policy of the Melbourne City Council).
Institutional	Policy that was enacted, endorsed, and/or implemented by a public or private institution for its own purposes (e.g. a policy of the Melbourne High School).
POLICY SECTOR	The sector in which and/or for which a policy was developed and/or implemented
Health	The health sector includes all policies relevant to products and services for preventive, curative, rehabilitative, or palliative healthcare (e.g. a document by the U.S. Department of Health and Human Services *Physical Activity and Health: A Report of the Surgeon General,* which mentions that healthcare professionals in schools should be especially trained to gain motivational interviewing skills related to PA [U.S. Department of Health and Human Services, 1996]).
Sport	The sport sector includes all policies that refer to products and services for active or passive engagement of people in sport (e.g. *Scotland's sport strategy for children and young people – Giving children and young people a sporting chance,* which sets out Scottish Government's vision for children and young people's participation in sport [The Scottish Government, 2014]).
Recreation and leisure	The recreation and leisure sector includes all policies that refer to products and services for active or passive engagement of people in recreational exercise and other leisure-time physical activities (e.g. *Leisure Strategy and Action Plan 2015-2020* by the City of Darebin, which is a local-level document issued to direct the promotion of mental and physical wellbeing through active lifestyle [City of Darebin, 2015]).
Education	The education sector includes all policies related to providing education to people in educational settings, such as childcare centres, schools, and universities (e.g. *Physical and Sport Education policy* by the State of Victoria, Australia, which states that it is mandatory for all government schools to conduct sport and physical education [State Government of Victoria Education and Training, 2017]).
Transport	The transport sector includes all policies related to the transportation of humans, animals, and goods (e.g. *Smarter Travel, A Sustainable Transport Future - A New Transport Policy for Ireland 2009-2020*, issued by the Department of Transport, Tourism and Sport, which aims to support and promote active transportation, in particular walking and cycling [Department of Transport Tourism and Sport, 2009]).
Environment	The environment sector includes all policies relevant to products and services related to the built and natural environment (e.g. Swiss national *Environment and Health Action Plan,* which aims to double the number of journeys made by bicycles, as they

	are an example of ecologically sound and health-promoting form of mobility [Kahlmeier, Bircher, Haller, Kränzlin, & Braun-fahrländer, 2000]).
Urban/rural planning and design	The urban/rural planning and design sector includes all policies relevant to the design and development of land use, the built environment, and infrastructure in and around urban and rural areas (e.g. Norway's *the Planning and Building Act,* which mentions that configuration of physical surroundings affects the opportunities to engage in PA [Bull et al., 2014d]).
Tourism	The tourism sector includes all policies relevant to attracting, accommodating, and entertaining tourists and organising travel for business and pleasure (e.g. *Switzerland Mobility* programme, a national-level set of resources for bicycling, walking, hiking, and additional activities which also provides tourism offers [Bellew et al., 2011]).
Work and employment	The work and employment sector includes all policies relevant to the workplace, paid work, volunteer work outside the volunteer's household, employment, and retirement (e.g. A guidance document entitled *Best practices for the assessment and control of physical hazards* by the Government of Alberta, Canada, which states that workers should be encouraged to move around and stand up as much as possible [Government of Alberta, 2011]).
Public finance	The public finance sector includes all policies related to allocation of monetary resources (e.g. *The Victorian Budget 2018/19* which includes allocation of AUD 22.7 million to improve the active transportation network [Government of Victoria, 2018]).
Research	The research sector includes all policies relevant to systematic creation of new knowledge and the use of the current body of knowledge to creatively generate new outcomes. PA-related policies in this sector may indirectly affect PA in the population (e.g. Canada's *Physical Activity and Sport Act,* which states that the Minister will take appropriate measures to assist in studies or research related to sport and PA [Government of Canada/Gouvernement du Canada, 2003] or the decision made by a Ministry of Science to allocate additional funds for research on the effectiveness of population-level PA interventions).
TYPE OF POLICY	Type of a policy according to its format (i.e. written or unwritten) and character (i.e. formal vs. informal and binding vs. non-binding)
Formal written policies	Formal written codes, strategies, plans, decisions, regulations, and directives that have been officially enacted and/or endorsed by the governing body at a given level, such as the national government at the national level or a school board at the institutional level (e.g. *Active Victoria, A strategic framework for sport and recreation in Victoria 2017-2021*, issued by the Victorian Government, Department of Health and Human Services [Victorian Government, 2017]).
Unwritten formal statements	Official statements made in public by or on behalf of an official representative that were not put in writing (e.g. statement made by Senator Bridget McKenzie, the Australian Minister for Rural Health, Sport and Regional Communications, in her speech at the Australian Local Government Association's Annual General Assembly about the commitment of the Australian Government to improve PA of people living in regional areas).
Written standards and guidelines	Written policies that guide choices, that is, they only recommend certain behaviours, practices, or processes but do not create an obligation for stakeholder adherence (e.g. *Australia's Physical Activity and Sedentary Behaviour Guidelines*, issued by the Australian Government, Department of Health [Australian Government, 2014]).
Formal procedures	Formal actions and processes conducted or authorised by an official body or their representatives that are indicative of the body's position or commitment regarding PA (e.g. surveillance of PA through the *Australian Health Survey* commissioned by the Australian Government is an indicator of potential commitment of the Government to support the promotion of PA [Australian Bureau of Statistics, 2011]).
Informal policies	Informal norms, actions, voluntary codes of practice and processes supported by an official body or their representatives that are indicative of the body's position or commitment regarding PA (e.g. traffic police implement an informal policy based on an unwritten norm not to fine cyclists who ride bicycles on footpaths in areas where there are no designated bike paths, despite the fact that a formal written policy forbids cycling on footpaths).

STAGE OF POLICY CYCLE	A stage in the life cycle of a policy
Agenda setting	A stage in the policy cycle encompassing the processes of problem identification that require attention from the governing body at a given level (e.g. by the national government at the national level or by a school board at the institutional level). Typical examples of questions include: “What informed the agenda setting for the national PA strategy?”; “What processes were undertaken to set the agenda?”; and “Who participated in the agenda setting?”.
Formulation	A stage in the policy cycle encompassing the processes included in the development of a policy. It may involve various processes such as setting objectives, conducting consultations with stakeholders, selecting possible solutions to a problem defined in the previous stage, or estimating costs. Typical examples of questions include: “What informed the formulation of the national PA strategy?”; and “Who participated in the development of the policy?”.
Endorsement/ legitimisation	A stage in the policy cycle encompassing actions and processes directed at endorsing and/or enacting a policy and ensuring that policy has a required political support. Typical examples of questions include: “Which bodies advocated for the adoption of the national PA strategy?”; “Which official body enacted the policy?”; and “How was the policy enacted, that is, did it involve legislative or executive approval or both?”.
Implementation	A stage in the policy cycle encompassing mechanisms and actions used to put a policy into practice. Typical examples of questions include: “Was the policy implemented as intended?”; “How was the policy implemented?”; and “Which bodies participated in the implementation of the policy?”.
Evaluation	A stage in the policy cycle encompassing mechanisms and actions used to appraise a specific policy and its impacts. This stage of the policy cycle should not be confused with a*ssessment* as a purpose of policy analysis. Typical examples of questions include: “Did a governmental body or an independent body appointed by the Government appraise the content of the national PA action plan?”; “What procedures are in place for evaluation of the national PA strategy?”; “Was the impact of national PA guidelines determined by an official body?”; and “What formal procedures are in place to determine the impact of the national PA strategy?”.
Maintenance	A stage in the policy cycle defined by continuation of a policy without any changes or with amendments. Typical examples of questions include: “What are the main reasons for the continuation of a policy?”; and “Who made the decision about the policy maintenance?”.
Termination	A stage in the policy cycle encompassing actions and processes related to the decision that policy will be discontinued. Typical examples of questions include: “Why was the national PA strategy terminated?”; “Which processes contributed to its termination?”; and “What are the expected consequences of the termination of the national PA strategy?”.
Succession	A stage in the policy cycle after the termination of a policy. In this stage, the policy in question may or may not be replaced by another policy. Typical examples of questions include: “Which policies replaced the national PA strategy after its end date?”; “Are all aspects of the discontinued PA strategy covered by the new policies?”; and “Why national PA strategy was not replaced with another policy after its end date?”.
SCOPE OF ANALYSIS	The subject matter encompassed by a policy analysis
Availability	Analysis of whether a policy exists or not (e.g. the presence of a national PA plan).
Context	Analysis of the economic, environmental, legal, political, social, and any other circumstances relevant to a policy or a stage of the policy cycle. Typical examples of questions about context would include: “Were there any specific economic circumstances around the development of the national PA strategy?”; “What budget has been allocated for the implementation of the national PA strategy?”; “What was the key stimulus for a policy action (e.g. the European Union encouraged its member states to develop national PA plans, decision maker’s personal involvement in sport and PA promotion, etc.)?”; “What are the dominant values held by the body endorsing the national PA strategy (secular, liberal, conservative, socialist, capitalist, etc.)?”;

	"What influence does private sector have on policy making process?"; and "Was the local PA policy developed based on the separation of powers doctrine?".
Processes	Analysis of the procedures, mechanisms, and/or actions in a given stage of the policy cycle. Typical examples of questions include: "What processes did the national PA strategy have to go through to become implemented (e.g. after Minister's proposal, the strategy was approved by the Parliament; only one ministry approved and issued the strategy; or several ministries issued the strategy but it was not sent to the Parliament etc.)?"; "Which mechanisms are in place to support the dissemination of PA guidelines (e.g. communication strategy)?"; "Which mechanisms were in place in the development stage of the national PA strategy (e.g. the national PA strategy was developed through inter-ministerial discussions and workshops with key stakeholders)?"; and "Did a development process of the national PA strategy allow for suggestions and improvements to be made?".
Actors	Analysis of the stakeholders in a given stage of the policy cycle. Typical examples of questions include: "Which bodies proposed the national PA strategy?"; "Who were the actors involved in the development of the national PA action plan?"; "Are any non-governmental organisations assisting in the implementation of the national PA strategy?" and "What were the power relations between the actors involved in the development of the national PA strategy?".
Political will	Analysis of the level of political support and/or commitment to a policy in a given stage of the policy cycle. Typical examples of questions include: "Does the Government hold regular discussions with the aim to support the implementation of national PA policy?"; "Did the Government demonstrate political will to support the implementation of the national PA strategy?"; and "Did any political actor in power publicly express support to the development of the national PA strategy?".
Content	Analysis of the wording and substantive information included in a specific policy. Typical examples of questions include: "Does the national PA strategy reference specific target groups?"; "Does the national PA strategy have a clear statement on the timeframe for policy implementation?"; "Does the national PA strategy mention joint collaboration at different levels of government (e.g. local, regional, state)?"; "Are the national PA recommendations in your country fully in line with the WHO Global Recommendations on Physical Activity for Health?"; and "Is the policy content predominantly *downstream* (education, information) or *upstream* (legislation, standards, change of the environment)?".
Effects	Analysis of the economic, environmental, public health, social, and other potential impacts of policy. Typical examples of questions include: "What kind of impact did the national PA strategy have on PA levels?" and "Were there any unintended consequences of the implementation of the national PA strategy?".

PA: Physical Activity, U.S.: United States, WHO: World Health Organization

5.3.1. Definitions of PA policy and PA policy analysis

According to the CAPPA framework, PA policy is indicated by the totality of formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and informal policies (or lack thereof) that may directly or indirectly affect community- or population-level PA. Accordingly, we defined PA policy analysis as any kind of policy-relevant research that audits or assesses one or more aspects of PA policy.

5.4. Discussion

In this study, we developed the CAPPA framework as a conceptual inventory of components necessary for a comprehensive analysis of PA policy, including definitions of two different purposes of analysis, five policy levels, eleven policy sectors, five types of policy, eight stages of policy cycle, and seven elements that reflect the scope of policy analysis. The framework was developed to improve the comprehensiveness and contribute to the standardisation of PA policy analysis research. This comprehensive conceptual framework may serve as a "road map" for researchers and academics interested in PA policy analysis as well as to policymakers and health policy practitioners interested in the development, monitoring, implementation, and analysis of PA policies. The framework can also be used for categorising PA policies or as a classification system for PA policy research. To further facilitate the standardisation of PA policy research, we also proposed definitions of PA policy and PA policy analysis that are aligned with the CAPPA framework.

5.4.1. Purpose of analysis

Studies can be conducted with the purpose of *auditing* and/or *assessment* of PA policies. Policy auditing is a prerequisite for policy assessment, as we first need to know which aspects of policy exist (or existed), before we can assess them. An *assessment* of the aspects of policy identified in the audit process will then determine how good they are against certain standards. For a comprehensive analysis of PA policies, it is important to both audit and assess relevant policies. For example, a country may have a range of national PA policies in place, including a PA strategy and a PA action plan, but it is possible that none of them are evidence based, none of them

specify clear targets, none of them define feasible ways to improve population-levels of PA, and none are funded or implemented. Policy *assessment* may need to be done to elucidate some of the important questions about PA policies. It should be noted, however, that policy *auditing* and policy *assessment* may be extremely time-consuming, and it is, therefore, often not practical to conduct both within a single study.

5.4.2. Policy level

PA policies can be developed at various levels. The simplest classification found in the literature makes a distinction between PA policies that occur at the national and international levels (Lankenau, Solari, & Pratt, 2004). PA policies at the national level are usually developed by the Government or a governmental body, but they may also be developed by non-governmental or advisory bodies, and later endorsed by the Government. The ways to classify policies below the national level may vary depending on the country in question and its political system. Policies can be developed and implemented on *subnational* levels such as state, federal, municipal, regional, and provincial. The CAPPA framework was developed with the intention of being as applicable as possible to various political systems. Therefore, we did not distinguish between a range of different levels that are below the national level and above the local level. Instead, we encompassed all such levels with the broad term "subnational". PA policy researchers should, however, clearly distinguish between different *subnational* levels in the context of the political system they are investigating and endeavour to analyse policies separately at each of the levels. Schmid et al.'s (2006) conceptualisation of *scale* (i.e. equivalent to *policy level* in the CAPPA framework) does not include the "institutional" level, because their framework focused mainly on public policies, that is, the policies related to government actions (Dye, 2013). In the CAPPA framework we included the "institutional" level, because policies at this level often have a key role in the development and implementation of PA interventions. Furthermore, it can be assumed that policies at one level may influence the adoption and shaping of policies at other levels. For a complete understanding of PA policy, it is therefore important to analyse policies at all levels, as well as to consider their possible interactions.

5.4.3. Policy sector

Policies in a range of sectors may directly or indirectly affect PA levels in the population (Bull et al., 2015; World Health Organization, 2015). This is also acknowledged in the Schmid et al.'s framework (2006), which includes five sectors: health; transportation; parks/public spaces; worksite; and school. In the CAPPA framework we built on Schmid et al.'s sectors and added other sectors that were previously identified as relevant to this research field such as: public finance; research; sport; recreation and leisure; and tourism (World Health Organization, 2018b; Schmid et al., 2006; Bull et al., 2015; World Health Organization, 2015).

It should be noted, however, that policy sectors may be termed differently and overlap more or less, depending on the specific context of a given country. Therefore, the CAPPA sectors should be interpreted in the context of a specific country. Furthermore, we acknowledge that PA policies can, and in many cases should, be cross-sectoral, that is, developed and/or implemented across multiple sectors. When classifying a policy according to the CAPPA framework, one should, therefore, not necessarily try to fit it within a single sector. This may present a methodological challenge in some classifications, but it is inevitable due to the complex nature of PA policies. Future users of the CAPPA framework may choose to report on all sectors to which a policy applies or to prioritise the sector that initiated or is responsible for the policy. For example, in the case of a *Walk to school policy* issued by the Ministry of Education, the priority could be given to the education sector, but a policy analyst could choose to report that this policy also belongs to the transport sector. When making such classifications, it is, therefore, important to clearly describe the criteria that were applied.

We also aimed to clearly differentiate between "sectors" and "settings", because one sector usually includes multiple settings and one setting can belong to multiple sectors. For example, the education sector includes settings such as childcare centres, primary schools, secondary schools, and universities. At the same time, each of these settings is also a part of the work and employment sector, because they employ their staff. There is a vast number of settings that might include PA-related policies, and any attempt to list them all is unlikely to result in an exhaustive inventory. For this reason, in the

CAPPA framework we did not provide a list of settings that are potentially relevant from the perspective of a comprehensive PA policy analysis. PA policy researchers should consider analysing PA policies in all the sectors included in the CAPPA framework and in as many relevant settings as possible.

5.4.4. Type of policy

There are different types of policies, and they are not necessarily always in the written form. This has already been acknowledged by Schmid et al. (2006). They conceptualised policy at three levels: (i) formal written regulations, codes, or decisions bearing legal authority; (ii) written standards that guide choices; and (iii) unwritten social norms (Schmid et al., 2006). *Formal written policies* in the CAPPA framework correspond to Schmid et al.'s first level. *Written standards and guidelines* and *informal policies* in the CAPPA framework correspond to the second level and the third level in the Schmid et al.'s framework (2006), respectively. As suggested by Schmid et al., *informal policies* are "considered to be part of culture rather than explicit policy and not a primary focus of initial physical activity policy research" (2006, p. S22). However, analysing *informal policies* could bring additional valuable insights into overall PA policy directions that may subsequently inform policy decision making. Policy may be conceptualised in a broader sense to also include *formal procedures* (Rütten et al., 2012) and *unwritten formal statements* (Althaus et al., 2013), which has been acknowledged in the CAPPA framework. Such statements may play an important role in shaping the general policy context within which the dominant beliefs may subsequently get converted into formal written policies. *Formal procedures,* such as PA surveillance, may be indicators of the body's position or commitment regarding PA. Formal procedures are usually (but not necessarily) supported by a formal written or unwritten policy. Furthermore, the analysis of *unwritten formal statements* may also provide valuable insights about the intentions of a given body regarding PA. The definition of *unwritten formal statements* in the CAPPA framework is in line with the definition of public policy as an "authoritative statement by a government about its intentions" (Althaus et al., 2013, p. 5). *Unwritten formal statements* related to PA have previously been studied mainly using discourse analysis as a research method (Gillon, 2010; Lagos, 2016).

Investigating understudied types of policies may help better elucidate policy-related correlates of PA. For example, a conclusion that a certain country has an underdeveloped PA policy simply based on an analysis that showed it lacks *formal written policies*, may be misleading. The country might have *informal policies* in place that promote PA, and *unwritten formal statements* created through announcements or verbal declarations by its decision makers may indicate the government has well-conceived plans and mechanisms for PA promotion. In a different example, a country might have a well-developed *formal written policy*, but certain *informal policies* and *unwritten formal statements* (or lack thereof) may indicate a lack of political will to support PA promotion. It is important to note, however, that analysing *unwritten formal statements* and *informal policies* could be challenging, as they may be more difficult to identify and evaluate than *formal written statements, written standards and guidelines,* and *formal procedures*.

5.4.5. Stage of policy cycle

The list and definitions of stages of policy cycle in the CAPPA framework, were mainly informed by the health policy and political science literature. The concept of policy cycles was originally "employed prescriptively as a way to organize policymaking", but it further evolved as a framework common for analysing policies (Cairney, 2012, p. 6). The WHO specified the following stages of the policy cycle: problem identification and agenda setting; policy formation; adoption; policy implementation; and policy evaluation (World Health Organization, 2005). Informed by Cairney's (2012) conceptualisation of the policy cycle, for the purpose of the CAPPA framework we adapted the WHO's five-stage policy cycle to include an additional three elements ─ maintenance, termination, and succession. The CAPPA framework contains eight stages which is an important advance from the four-stage structure of Schmid et al.'s earlier framework (2006).

It should be noted that a policy will not necessarily go through all the stages of the policy cycle. For example, a policy may be enacted by Parliament, but that does not necessarily mean it will ever be implemented in practice. Furthermore, stages in the cycle of a given policy may not necessarily be in the order presented in the CAPPA framework. For example, some policies may be formulated without going through the *agenda setting* stage. Some policies may be formulated, maintained, and terminated

without ever being implemented or ever being evaluated. Furthermore, a policy may pass multiple times through the same stage (e.g. a policy can be evaluated on several occasions). For a thorough understanding of a PA policy, it is important to analyse all the stages that it went through.

Scope of analysis

Most previous research on national PA policies has focused on analysing *availability* of policies (i.e. whether specific policies exist) and their *content* (i.e. what information they include) (Klepac Pogrmilovic et al., 2018). Analysis of *availability* of policies should not be confused with *auditing* as a purpose of PA policy analysis, because theoretically the availability of policies can be both audited (e.g. using the open-ended questionnaire item: "Please list the PA policies that are available in your country!") and assessed (e.g. using the question: "How would you rate the range of PA policies available in your state compared to the national level?", with the response scale: "Less available policies" / "Similar number of available policies" / "More available policies"). The analysis of policy *content* should not be confused with *assessment* as a purpose of PA policy analysis, because the content of a policy can also be both audited (e.g. using the question "Does the national PA strategy include specific targets for different population groups?", with the "yes/no" response scale) and assessed (e.g. with the question: "On a scale from 0 to 10, please rate the overall quality of the national PA strategy"). For some types of PA policy, the analysis of *content* can be performed by using qualitative methods for content analysis, that is, by coding and interpreting text of written documents, transcribed oral communications, and graphics.

Furthermore, Walt's (1996) simple health policy analysis framework distinguishes between four elements: *context, content*, *process*, and *actors*. Context, content, processes, and actors often play pivotal roles in different stages of the policy cycle. In the CAPPA framework, we therefore acknowledge the importance of analysing all these elements in addition to the *availability, political will,* and the *effects* of policies. Political will represents a bridge between public health action and knowledge (Lezine & Reed, 2007) and is considered to be essential for making changes in public health policy (Cullerton, Donnet, Lee, & Gallegos, 2016). Political support and commitment to a PA policy are recognised as highly relevant factors for the success of the policy and are therefore important parts of a comprehensive PA policy analysis (Bellew et al.,

2008; Bull et al., 2015; Tremblay et al., 2014; Yancey, Cole, & McCarthy, 2010). Researchers may be deterred from analysing the effects of PA policies, because these may be difficult to measure. It has therefore been suggested, as one of the key priorities for the progress of the PA policy research field, to develop better tools for analysing the effects of policies (Schmid et al., 2006). This was recognised by the Physical Activity Policy Research Network (PAPRN) in the USA, which conducted a ten-year study of the effectiveness of policies to increase levels of PA (Prevention Research Center, 2018). In 2017, they concluded there is a lack of studies on the outcomes of PA policies (Manteiga et al., 2017).

When it comes to an overall policy-making process, political power is often a vital force. In the political arena, various groups exercise their political power to reach their goals, either by advocating for a change or blocking it (Birkland, 2014). In health policy analysis, power is usually considered in relation to two elements of the CAPPA framework; namely, *processes* and *actors* (Buse et al., 2009). However, power can also be studied within other elements of the *scope of analysis* category such as *political will* or *context*. *Political will*, necessary to introduce any policy change, may be highly influenced by power relations and values within and outside of the government. For example, members of the government can have a strong political will to increase resources necessary for the implementation of a nutrition and PA strategy that aims to reduce children's obesity rates. However, powerful food industry lobbies may block the strategy implementation, if the proposed measures are not in their best interests.

Definitions of PA policy and PA policy analysis

Within the field of political science, there is no consensus on what constitutes "a policy" or a policy analysis (Klepac Pogrmilovic et al., 2018). Similarly, within the PA research field, "PA policy" was defined and conceptualised differently across studies, whilst a large majority of the studies on national PA polices did not explicitly state how they defined PA policy (Klepac Pogrmilovic et al., 2018). The majority of studies that provided their operational definition of PA policy conceptualised policy within Schmid et al.'s first level (Klepac Pogrmilovic et al., 2018), that is, as the formal written regulation, code, or decision bearing legal authority (Schmid et al., 2006) which corresponds to *formal written policies* in the CAPPA framework. For example, several PA policy studies relied on the definition of a policy that conceptualises 'policy' as a 'policy document', that is, "a written document that contains strategies and priorities,

defines goals and objectives, and is issued by a part of the administration" (Daugbjerg et al., 2009; Christiansen et al., 2014; Bull et al., 2015). Restricting the conceptualisation of PA policy only to "written documents" may be practical for researchers because these types of policies are usually the easiest to identify. However, this approach may exclude other possible aspects of policy such as "unwritten statements". Some health and PA policy researchers based their studies on a broader definition of policy, which besides formal statements also includes informal institutional procedures, arrangements, and justifications for action (Rütten et al., 2012). We acknowledge that various studies have different purposes and may therefore employ the most suitable definition for the scope of the study. We also acknowledge that it may be impossible to analyse all aspects of PA policy in a single study and that sometimes it may be necessary to reduce the analysis to only one or two aspects of PA policy. However, we believe a comprehensive standardised definition of PA policy may contribute to further development of the PA policy research field. Therefore, based on the CAPPA framework and various understandings of PA policies that were detected in our recent systematic scoping review (Klepac Pogrmilovic et al., 2018), we defined PA policy broadly, to be as inclusive as possible. We used a similar comprehensive and inclusive approach in defining PA policy analysis, whilst relying on the CAPPA framework and a broad definition of policy analysis from the field of political science (Hird, 2017).

5.5. Possible applications of the CAPPA framework in PA policy research

The CAPPA framework can be used for a variety of purposes. These include (but are not limited to): (i) to help PA policy researchers conceptualise their study questions, that is, as a source of ideas what can and should be analysed; (ii) as a benchmark for evaluating what has been done in terms of PA policy research overall, in its specific areas, and in specific contexts (e.g. in specific countries); (iii) as a guide for policymakers, who want to influence population-level PA, on which types of policies and which policy sectors they can focus on in their endeavours; (iv) to help PA policy researchers improve between-study comparability, particularly by using the definitions provided within the framework; (v) to help assess the comprehensiveness and content validity of the available tools for PA policy analysis; and (vi) to guide the development

of new PA policy analysis tools, particularly regarding the facets of PA policy they are intended to measure.

A practical example of a possible application of the CAPPA framework can be found in our recent systematic review of instruments for PA policy analysis (Klepac Pogrmilovic et al., 2019b). For every instrument included in the review we determined whether it was designed for *auditing* or *assessment* of PA policies, which *policy sectors*, *types of policy*, and *stages of policy cycle* it covers, and what is encompassed in its *scope of analysis*. The list of elements of the CAPPA framework served as a benchmark for the assessment of comprehensiveness of the included instruments. An extract (for four sample instruments) from the data extraction table can be found in Table 3. The definitions provided in the CAPPA framework enabled us to conduct the assessments consistently across all instruments and between two authors who took part in the data extraction process. In the same review, we used the CAPPA framework also to guide the synthesis of findings. It enabled us to easily identify which elements needed for a comprehensive analysis of PA policy cannot be analysed using the available instruments.

Table 3. An example of a possible application of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework: an extract from a review of instruments for the analysis of physical activity and/or sedentary behaviour policies

INSTRUMENT	CAPPA elements covered by the instrument				
	Purpose of analysis	Policy sector	Type of policy	Stage of policy cycle	Scope of analysis
Health enhancing physical activity (HEPA) policy audit tool (PAT), (Bull et al., 2014a; Bull et al., 2014b; Bull et al., 2014c, 2014d)	Auditing Assessment	Education Environment Health Sport Recreation and leisure Tourism Transport Urban planning and design Work and employment	Formal written policies Written standards Formal procedures	Formulation Implementation Evaluation Maintenance	Availability Context Processes Actors Political will Content
A Graphical, Computer-Based Decision-Support Tool to Help Decision Makers Evaluate Policy Options Relating to Physical Activity (Yancey et al., 2010)	Assessment	None	None	Formulation Implementation	Context Effects
Global Observatory for Physical Activity (GoPA!) questionnaire (Ramirez Varela et al., 2017; Ramirez Varela et al., 2016)	Auditing	None	Formal written policies Formal procedures	None	Availability
Analysis of Determinants of Policy Impact (Rütten et al., 2012; Rütten et al., 2010)	Auditing Assessment	None	Formal written policies Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Content Effects

5.6. Applicability of the CAPPA framework to the analysis of sedentary behaviour policy

Research suggests that uninterrupted prolonged periods of sedentary behaviour (SB) (i.e. waking activities in a sitting, reclining, or lying posture with very low energy expenditure) are associated with increased risk of cardiovascular disease, type II diabetes, and some types of cancer (de Rezende et al., 2014). It was estimated that high SB is responsible for nearly 4% of deaths from all causes internationally (de Rezende

et al., 2016). It is therefore of public health importance to reduce SB in the population. PA and SB are often considered within the same study, as these behaviours are co-dependent (Pedišić et al., 2017). A recent review found that all but one study that analysed national SB policies also analysed PA policies (Klepac Pogrmilovic et al., 2018). Given that PA and SB policy research fields largely overlap and that contexts of PA and SB policies are very similar, the CAPPA framework and definitions analogous to the ones provided for PA policy and PA policy analysis may also be used to guide research on SB policies.

5.7. Strengths and limitations of the study

The key strength of this study is a rigorous method used to develop of the framework, which included an extensive literature review, three rounds of Delphi process, and two rounds of consultations with stakeholders. The CAPPA framework provides a categorisation of a complex area into measurable component parts. Each of these components is defined, and can be audited and assessed in combination to provide a comprehensive understanding of PA policy. The main strengths of the CAPPA framework are its: (i) comprehensiveness; (ii) generalisability to different political contexts; (iii) supporting definitions that underpin each building block of the framework and its elements; and (iv) visual simplicity.

The CAPPA framework is also subject to some limitations. The authors aimed to make the building blocks of the framework and their elements as generalisable as possible, but given a variety of policy contexts internationally, some elements may not be applicable to all countries. Also, due to the complexities in the political context, an overlap between the various elements of the framework was inevitable. Future users of the framework should acknowledge the possible overlap and specify the way they choose to deal with it. Whilst the first draft of the framework was developed based on a comprehensive literature review, due to the wealth of literature in the fields of political science, health policy research, and PA policy research, the authors acknowledge there might be aspects of PA policy analysis that are not encompassed by the CAPPA framework.

5.8. Conclusion

The CAPPA framework may be used to guide future studies related to PA policy, provide a context for the description, understanding, and analysis of its specific components and serve as a classification system for research on PA policies. It may also serve as a benchmark for the evaluation of comprehensiveness of existing tools for the analysis of PA policy and guide the development of new tools. The framework can be used in the same way for SB policy research. Operational definitions of different aspects of policy varied significantly across previous studies in this area (Klepac Pogrmilovic et al., 2018). The definitions of specific types of policy, aspects of policy, and purposes of policy analysis provided in the CAPPA framework might help in achieving standardisation of terminology in this area and in improving the comparability of findings across different studies. Future research should examine the extent to which PA policy analysis has covered each of the elements specified in the CAPPA framework. Future studies should also evaluate whether the existing tools for PA policy analysis allow for auditing and assessment of all the elements of the CAPPA framework and develop new tools where needed.

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DECLARATION OF CO-AUTHORSHIP AND CO-CONTRIBUTION: PAPERS INCORPORATED IN THESIS

This declaration is to be completed for each conjointly authored publication and placed at the beginning of the thesis chapter in which the publication appears.

1. PUBLICATION DETAILS (to be completed by the candidate)

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I declare that the publication above meets the requirements to be included in the thesis as outlined in the HDR Policy and related Procedures – policy.vu.edu.au.

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Signature **Date**

3. CO-AUTHOR(S) DECLARATION

In the case of the above publication, the following authors contributed to the work as follows:

The undersigned certify that:

1. They meet criteria for authorship in that they have participated in the conception, execution or interpretation of at least that part of the publication in their field of expertise;
2. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

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3. There are no other authors of the publication according to these criteria;
4. Potential conflicts of interest have been disclosed to a) granting bodies, b) the editor or publisher of journals or other publications, and c) the head of the responsible academic unit; and
5. The original data will be held for at least five years from the date indicated below and is stored at the following **location(s)**:

November 2019, electronically stored on VU R drive. Hard copies are stored in a locked cabinet in office PB201 at VU Footscray Park campus.

Name(s) of Co-Author(s)	Contribution (%)	Nature of Contribution	Signature	Date
Grant O'Sullivan	5	- conducted duplicate study selection, read, approved and contributed to writting	[redacted]	11/12/2019
Karen Milton (supervisor)	5	- conceptualised the review, read, approved and contributed to writing		09/12/2019
Stuart Biddle (supervisor)	5	- conceptualised the review, read, approved and contributed to writing		22/11/2019
Zeljko Pedisic (principal supervisor and corresponding author)	10	- contributed to the overall idea, study conceptualisation, search strategy, data extraction, reading and writing		14/12/2019

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6. A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies[3]

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[3] Published version of this manuscript is available in Appendix A3. It was published in *Health Research Policy and Systems*.

Abstract

Background: This systematic review aimed to identify and critically assess available instruments for the analysis of national-level physical activity (PA) and sedentary behaviour (SB) policies and provide recommendations for their future use.

Methods*:* We conducted a systematic search of academic and grey literature through six bibliographic databases, Google, and the websites of three international organisations for PA promotion, to identify instruments that are used or that may be used for national-level PA/SB policy analysis. In order to describe and categorise the identified instruments, we used the *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework. The framework specifies the elements of a comprehensive analysis of PA/SB policies, through the following categories: purpose; level; policy sector; type of policy; stages of policy cycle; and scope of analysis.

Results: Out of 22,071 screened items, 26 publications describing 16 instruments met the selection criteria. All of the instruments can be used for analysing PA policy, whilst only two include questions about SB policy. None of the instruments allow for the analysis of all the relevant components of national PA/SB policy. Some important elements of PA policy analysis such as the *tourism* and *research* sectors, the *agenda setting* and *endorsement/legitimisation* stages, and the *effects* of policy are addressed by only a few instruments. Moreover, none of the instruments address *unwritten formal statements*, *informal policies*, and the *termination* and *succession* stages of the policy cycle.

Conclusion: Designing new instruments or adapting existing ones is needed to allow for a more thorough analysis of national PA and SB policies. Given that policy analysis covering all important components of PA/SB policy may be extremely time-consuming, a way forward might be to develop a set of complementary instruments, with each tool collecting detailed information about a specific component.

Key words: physical activity, sedentary behaviour, national policy, policy analysis, instrument, tool, framework

6.1. Background

In 2008, it was estimated that one in ten deaths worldwide were attributable to insufficient physical activity (PA) (Lee et al., 2012). If rates of physical inactivity were to be reduced by just 10 to 20 per cent, between half a million to more than a million lives could be saved each year (Lee et al., 2012). It was estimated that, from 2002 to 2011, sedentary behaviour (SB) was responsible for 3.8% of all deaths (de Rezende et al., 2016). Physical inactivity and SB are not just key contributors to global mortality but there is also substantial economic burden to national healthcare systems worldwide associated with these behaviours. Estimates suggest that the lack of PA costs countries around the world over 50 billion dollars a year, of which almost 70% is paid by the public sector (Ding et al., 2016).

Both SB and insufficient PA are among the key risk factors for non-communicable diseases (NCDs), such as type 2 diabetes, cancer, and cardiovascular disease. NCDs are responsible for the deaths of almost 40 million people per year, which is approximately 70% of overall global mortality (World Health Organization, 2018d). Furthermore, low levels of PA and high levels of SB are also associated with negative mental health outcomes (Physical Activity Guidelines Advisory Committee, 2018; de Rezende et al., 2014).

National governments are crucial players in achieving positive changes in population health (World Health Organization, 2004). Governments are, in cooperation with other public health stakeholders, responsible for creating environments that empower individuals to make health-enhancing decisions (World Health Organization, 2004). One of the essential determinants of active living is the policy environment (Sallis et al., 2006), and the development and implementation of national policies may contribute to the creation of supportive environments for people to engage in physically active lifestyles (World Health Organization, 2018b; Bellew et al., 2011). The recent *Global Action Plan on Physical Activity 2018-2030,* issued by the World Health Organization (WHO), recommends twenty policy actions that produce multiple social, economic, and health benefits and are applicable to different national contexts (World Health Organization, 2018b). Typical examples of standalone PA policies are national PA action plans (e.g. *Get Ireland Active! The National Physical Activity Plan for Ireland*

[Healthy Ireland and Department of Health, 2016]) and national PA strategies (e.g. *Everybody active, every day - An evidence-based approach to physical activity* by Public Health England [2014]). PA and SB policies are also often included in national obesity prevention strategies (e.g. Mexican *National Strategy for the Prevention and Control of Overweight, Obesity and Diabetes* [Mexico - Gobierno de la Republica, 2013]), NCD prevention strategies (e.g. *National Multisectoral Strategic Plan for Prevention and Control of Non-Communicable Diseases in Namibia 2017/18-2021/22* [Ministry of Health and Social Services, 2017]), and public health strategies (e.g. *Healthy throughout Life – the targets and strategies for public health policy of the Government of Denmark, 2002–2010* [Government of Denmark, 2002]).

Progress regarding the development of national PA policies has been made in most countries (Sallis et al., 2016). However, with policy implementation generally being poor, countries are urged to take bold initiatives to address this issue (Sallis et al., 2016). PA and SB policy analysis can help tackle these challenges through: raising awareness of the current opportunities and gaps; promoting important cross-sectoral and cross-level debates (Bull et al., 2014a); providing a platform to improve public policy-making related to PA/SB; contributing to meeting various health objectives (Buse et al., 2009); and assisting policy makers in making better informed decisions (Quade et al., 1989).

Policy analysis, defined as "any form of policy-relevant research" (Hird, 2017, p. 44), encompasses the use of various instruments, tools, and techniques to study established policies, their development, and consequences (Collins, 2005). It is a valuable practice for continuous improvement of policies, and it has been developing for almost seventy years (Bardach et al., 2015, p. xvi; Lasswell et al., 1951). Health policy analysis has a central role in fostering successful health promotion reforms (Walt et al., 1994). There is no consensus on how to perform a policy analysis and which method is best (Klepac Pogrmilovic et al., 2018). A plethora of instruments, tools, and techniques are available for policy analysis in general (Dunn, 2004; Bardach et al., 2015; Colebatch, 2005; Friedman, 2017; Geva-May, 1997), health policy analysis (Walt et al., 1994; Collins, 2005; Walt et al., 2008), and specific areas within health policy, such as chronic illness (Cheung et al., 2010) or obesity policies (Sacks et al., 2009). Given that contexts and research questions relevant for policy analysis in different areas may greatly differ, not

all policy analysis instruments are universally applicable. Several instruments have, therefore, been developed specifically for the analysis of PA and SB policies (Bull et al., 2015; Global Observatory for Physical Activity, 2017). The *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework (Klepac Pogrmilovic et al., 2019a) defines 38 elements of a comprehensive analysis of PA and SB policies, through the following six categories: *purpose* which includes two elements - auditing and assessment of policies; *level* which includes five elements - international, national, subnational, local, and institutional policies; *policy sector* which includes eleven elements – health, sport, recreation and leisure, education, transport, environment, urban/rural planning and design, tourism, work and employment, public finance, and research; *type of policy* which includes five elements - formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and informal policies; *stage of the policy cycle* which includes eight elements - agenda setting, formulation, endorsement/legitimisation, implementation, evaluation, maintenance, termination, and succession of policy; and *scope of analysis* which includes seven elements - availability, context, processes, actors, political will, content, and effects. The CAPPA framework also provides definitions and key rationales underpinning each category and element of the framework (Klepac Pogrmilovic et al., 2019a). PA and SB are co-dependent behaviours (Pedišić et al., 2017) and the contexts of PA and SB policies are very similar (Klepac Pogrmilovic et al., 2019a). Owing to these facts, PA and SB policies are very often studied within a single study. A recent review found only one study that analysed SB policies independently of PA policies (Klepac Pogrmilovic et al., 2018). It was, therefore, suggested that the CAPPA framework can be used to guide research on SB policies.

Research on PA policies is growing and is much more developed than it was a few years ago (Klepac Pogrmilovic et al., 2018). Although SB policy research is still in its infancy, there has been some progress in recent years (Klepac Pogrmilovic et al., 2018). Klepac Pogrmilovic et al. (2018) found that various definitions were used to conceptualise PA/SB policy as well as various methodological approaches and instruments to perform PA policy analysis. This lack of standardisation may be desirable in young research fields, as it puts less constraints on methodological approaches, and therefore allows empirical evaluation of different methodologies.

However, it may also lead to a vague conceptualisation of research questions and can hinder cross-study and inter-policy comparability (Klepac Pogrmilovic et al., 2018).

The scope and quality of policy analysis and comparability of findings across studies will largely be determined by the quality, comprehensiveness, and uniformity of instruments used to perform the analyses. No previous systematic review has summarised information about the instruments used for the analysis of national policies related to PA and/or SB. The aim of this systematic literature review was, therefore, to identify and critically assess available instruments for the analysis of national-level PA/SB policies and provide recommendations for their future use. We aimed to assess: the purpose and scope of each instrument; the sectors and stages of the policy cycle they refer to; and the types of policy that they cover.

6.2. Methods

6.2.1. Search strategy

The primary search was conducted in six databases, namely: Scopus; SPORTDiscus; PubMed/MEDLINE; Web of Science (including Science Citation Index Expanded - SCI-EXPANDED, Arts & Humanities Citation Index - A&HCI, Conference Proceedings Citation Index- Science - CPCI-S, Social Sciences Citation Index - SSCI, and Conference Proceedings Citation Index- Social Science & Humanities - CPCI-SSH); Networked Digital Library of Theses and Dissertations (NDLTD); and Open Access Theses and Dissertations (OATD). The search was conducted through titles, abstracts, and keywords using the entries *"physical inactivity"*, *"physical activity"*, *sitting*, and *sedentar** and combining them with the terms *policy* and *policies.* A full search syntax is available in Additional file 1. The secondary search was performed through: (i) the reference lists of all included publications; (ii) citations of the included publications identified by Google Scholar; and (iii) the authors' own archives. Additional searches were conducted in Google and on the websites of the WHO and two large international PA promotion networks: the Active Healthy Kids Global Alliance and the Global Observatory for Physical Activity (GoPA!). We conducted a three-stage screening process that included: (i) automatic and manual exclusion of duplicates; (ii) manual screening of titles and abstracts; and (iii) assessment of eligibility based on full texts. The study selection was completed independently by two

authors (BKP and GO) in July 2017. Discrepancies between the study selections were resolved in a discussion with the third author (ZP). If perfect agreement between the three authors had not been reached in the discussion, the final decision was made based on a majority vote. A flow diagram of the search and study selection process is available in Figure 13.

6.2.2. Study selection and inclusion criteria

In this review, we considered the term *policy analysis* as a synonym for the terms *assessment, audit, evaluation*, and *review* of policy. We relied on the definition of PA policy analysis from the CAPPA framework, a conceptual inventory of components for a comprehensive analysis of PA policies, which can be used to guide the selection of existing instruments for policy analysis or the development of new ones (Klepac Pogrmilovic et al., 2019a). It defines PA policy analysis as "any kind of policy-relevant research that audits or assesses one or more aspects of PA policy" (Klepac Pogrmilovic et al., 2019a). Although developed primarily to guide the analysis of PA policies, the CAPPA framework can also be used in SB policy research (Klepac Pogrmilovic et al., 2019a).

By instruments, we considered *sets of criteria* and *measurement tools* that can be used for any aspect of PA/SB policy analysis. By a *set of criteria*, we considered a collection of principles that may serve as a guide for policy analysis. These sets of criteria do not usually include specific questions that may directly be used for policy analysis. By contrast, *measurement tools* contain specific questions that may be used in various types of research related to PA/SB policies.

To be included in the review, a publication had to meet the following two criteria:
(i) The publication includes an original description of an instrument that has been used or that may be used for national-level PA/SB policy analysis;
(ii) The abstract and/or the full-text of the publication is available in English.

6.2.3. Data extraction and coding

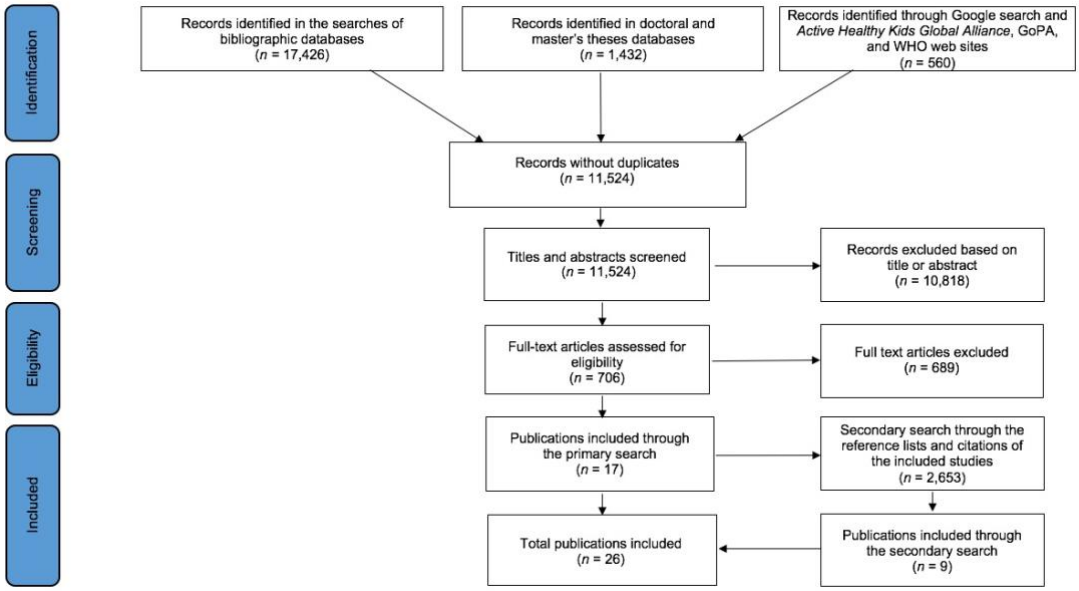
The following data were extracted for every identified PA/SB policy analysis instrument: (i) whether it addresses PA policy, SB policy, or both; (ii) whether its

purpose is auditing or assessment of policies; (iii) what sectors of policy it covers; (iv) what types of policies it covers; (v) what stages of the policy cycle it addresses; and (vi) the scope of the policy analysis that can be done using the instrument.

To describe and categorise the identified instruments, we relied on the CAPPA framework (Klepac Pogrmilovic et al., 2019a). We relied on all categories and elements presented in the CAPPA framework with the exception of a *policy level category*, because this review focused on national-level policies only.

The data extraction and coding were independently conducted by two authors (BKP and ZP). Disagreements between the authors were resolved by a discussion between all authors. Detailed data extraction is available in Table 4.

Figure 13. Flow diagram of the search and study selection process



GoPA: Global Observatory for Physical Activity, WHO: World Health Organization

6.3. Results

The primary search identified 19,418 records, leaving 11,524 after the removal of duplicates. Following title and abstract screening, 10,818 documents were excluded. Full-texts of the remaining 706 documents were reviewed, and 17 of them were deemed eligible. In the secondary search, we identified a further 2,653 documents. Nine of them met the inclusion criteria, providing a total of 26 publications for inclusion (Figure 1). These 26 documents (12 journal articles [Bull et al., 2014a; Bull et al., 2004a; Ramirez Varela et al., 2017; Daugbjerg et al., 2009; Bull et al., 2014b; Bellew et al., 2008; Christiansen et al., 2014; Rütten et al., 2012; Shephard et al., 2004; Rütten et al., 2010; Tremblay et al., 2014; Yancey et al., 2010]; 11 reports [Schöppe et al., 2004; World Health Organization, 2011; Branca et al., 2007; Bull et al., 2004b; Bull et al., 2014c, 2014d; Ramirez Varela et al., 2016; World Health Organization, 2015, 2007c, 2003, 2007d]; two published questionnaires [Bull et al., 2015; European Physical Activity Focal Points Network, 2015] and one unpublished questionnaire [Global Observatory for Physical Activity, 2017]) describe 16 instruments. The identified instruments and their assessments against the CAPPA framework are presented in Table 1. A description of included publications and all instruments is available in Additional file 2. Ten included instruments (described in 13 documents) are *sets of criteria* (Bull et al., 2004a; Daugbjerg et al., 2009; Schöppe et al., 2004; Bellew et al., 2008; Christiansen et al., 2014; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Bull et al., 2004b; Tremblay et al., 2014; World Health Organization, 2007c, 2003, 2007d). To help readers understand how these *sets of criteria* may be used to collect data about PA/SB policy we developed sample questions based on the items of one set of criteria (World Health Organization, 2003; Additional file 3). Furthermore, the remaining six included instruments (described in 13 documents) are *measurement tools* (Bull et al., 2014a; Ramirez Varela et al., 2017; Bull et al., 2014b; Rütten et al., 2012; Rütten et al., 2010; Bull et al., 2015; Bull et al., 2014c, 2014d; Ramirez Varela et al., 2016; World Health Organization, 2015; Yancey et al., 2010; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015). All included publications were issued from 2003 to 2017. Eight studies were funded by the European Union (EU) and/or by the WHO.

Only two included instruments refer to both SB and PA policies (Bull et al., 2015; Global Observatory for Physical Activity, 2017). All other instruments refer to PA policies only. The number of items in the included instruments ranges from two to 28 (mode = 8). The included instruments differ greatly in terms of their content and structure. Nevertheless, items about some elements of PA policy emerge repeatedly across multiple instruments. Eighty-one per cent (n = 13) of instruments contain items about: focus of policy on specific target groups; funding and available resources; and leadership and coordination. Seventy-five per cent (n = 12) of instruments address the importance of integration of PA policy in different sectors and settings. Evaluation of policies and surveillance/monitoring of PA/SB are addressed in 69% (n = 11) of the instruments. Setting specific goals for PA promotion is mentioned in 56% (n = 9) of the instruments, whilst the importance of involving different stakeholders in PA policy is addressed in 50% (n = 8) of the instruments. Forty-four per cent (n = 7) of the instruments address the significance of political support and the existence of PA guidelines as important parts of a successful PA policy. Items about the timeframe for policy implementation and consultations in the policy development process are included in 38% (n = 6) of the instruments. Evidence-based PA policy is addressed in 31% (n = 5) of the instruments.

Most publications excluded based on the title/abstract were: (i) not related to PA/SB (e.g. publications focused on climate change, war, history, racial differences, sedentarism/nomadism, tobacco/smoking, HIV/AIDS, food etc.); (ii) epidemiological studies related to various health issues; and (iii) PA/SB studies that were not about policies. Most publications excluded based on their full text were: (i) focused on PA/SB policies but did not describe and/or use any instrument for policy analysis; (ii) described and/or used an instrument for policy analysis that focused on international, subnational, local, or institutional PA/SB policies; or (iii) described and/or used an instrument for the analysis of health, sport, obesity, NCD, or chronic disease-related policies only, without specific reference to PA/SB policies.

6.3.1. Purpose of analysis

The majority of instruments (56%; n = 9) were developed for both policy auditing and assessment purposes (Bull et al., 2004a; Bellew et al., 2008; Shephard et al., 2004;

Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; World Health Organization, 2007c, 2003, 2007d). Five instruments (31%) were designed only for auditing purposes (Daugbjerg et al., 2009; World Health Organization, 2011; Ramirez Varela et al., 2016; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015) and two (12%) only for assessment purposes (Tremblay et al., 2014; Yancey et al., 2010). In total, 88% (n = 14) of the instruments contain items for auditing and 70% (n = 11) for assessment.

6.3.2. Policy sectors

Only 38% (n = 6) of the included instruments ask about specific sectors (Shephard et al., 2004; Branca et al., 2007; Bull et al., 2015; Tremblay et al., 2014; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015). The number of sectors addressed by these six instruments ranges between one and eleven. One instrument (6%; Bull et al., 2015) asks about policies in all eleven sectors included in the CAPPA framework. The e*ducation* sector, *health* sector, *transport* sector, and *urban/rural planning and design* sector are the most represented sectors. These are included in five instruments that ask about policy sectors (Shephard et al., 2004; Branca et al., 2007; Bull et al., 2015; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015).The s*port* sector (Shephard et al., 2004; Bull et al., 2015; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015), *leisure and recreation* sector (Shephard et al., 2004; Bull et al., 2015; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015), *work and employment* sector (Shephard et al., 2004; Branca et al., 2007; Bull et al., 2015; European Physical Activity Focal Points Network, 2015), and *public finance sector* (Branca et al., 2007; Bull et al., 2015; Tremblay et al., 2014; European Physical Activity Focal Points Network, 2015) are included in 25% (n = 4) of the instruments. The *environment* sector is addressed in 19% (n = 3) of the instruments (Bull et al., 2015; Global Observatory for Physical Activity, 2017; European Physical Activity Focal Points Network, 2015), the *research* sector in 13% (n = 2) of the instruments (Branca et al., 2007; Bull et al., 2015) and *tourism* is the least represented policy sector, included in only one instrument (6%; Bull et al., 2015).

6.3.3. Type of policy

The reviewed instruments include items on between one and three (out of five) different types of policy (mode = 2). Items about *formal written policies* are included in 88% (n = 14) of the instruments (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Ramirez Varela et al., 2016; Global Observatory for Physical Activity, 2017; World Health Organization, 2007c, 2003, 2007d; European Physical Activity Focal Points Network, 2015) followed by items on *formal procedures* in 63% (n = 10; Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; Shephard et al., 2004; Rütten et al., 2010; Bull et al., 2015; Ramirez Varela et al., 2016; Global Observatory for Physical Activity, 2017; World Health Organization, 2007d; European Physical Activity Focal Points Network, 2015) and *written standards and guidelines* in 38% (n = 6; Bellew et al., 2008; Bull et al., 2015; Global Observatory for Physical Activity, 2017; World Health Organization, 2007c, 2007d; European Physical Activity Focal Points Network, 2015) of the instruments. None of the instruments include items on *unwritten formal statements* or *informal policies*. Thirteen percent of the instruments (n = 2) do not address any specific type of policy (Tremblay et al., 2014; Yancey et al., 2010); they refer to PA policy in general, without specifying the type of PA policy.

6.3.4. Stages of policy cycle

The reviewed instruments include questions on one to four different stages of the policy cycle (modes = 3 and 4) out of eight possible stages included in the CAPPA framework. The majority of instruments (81%, n = 13) include items about the policy *implementation* stage (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Tremblay et al., 2014; Yancey et al., 2010; World Health Organization, 2007c, 2003; European Physical Activity Focal Points Network, 2015). In total, 69% (n = 11) of the instruments include items about the *formulation* (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Tremblay et al., 2014; Yancey et al., 2010; World Health Organization, 2003) and *evaluation* (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health

Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Tremblay et al., 2014; World Health Organization, 2007c, 2003) stages. The *maintenance* stage is addressed in three instruments (19%; World Health Organization, 2011; Bull et al., 2015; Global Observatory for Physical Activity, 2017) and *agenda setting* in two (13%) instruments (Shephard et al., 2004; Tremblay et al., 2014). Only one instrument (6%) includes items on the *endorsement*/*legitimisation* stage (Daugbjerg et al., 2009). None of the instruments include items about the *termination* and *succession* stages of the policy cycle. Two instruments (13%) do not include items on any particular stage of the policy cycle (Ramirez Varela et al., 2016; World Health Organization, 2007d).

6.3.5. Scope of analysis

The instruments include items on one to six elements that fall within the scope of analysis according to the CAPPA framework (mode = 3). The majority of instruments (88%, n = 14) include items about *actors* in the policy process (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Tremblay et al., 2014; Global Observatory for Physical Activity, 2017; World Health Organization, 2007c, 2003, 2007d; European Physical Activity Focal Points Network, 2015). Policy *content* is addressed in 81% (n = 13) of instruments (Bull et al., 2004a; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2011; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Global Observatory for Physical Activity, 2017; World Health Organization, 2007c, 2003, 2007d; European Physical Activity Focal Points Network, 2015) and policy *context* in 75% (n = 12; Bull et al., 2004a; Bellew et al., 2008; Shephard et al., 2004; Branca et al., 2007; Rütten et al., 2010; Bull et al., 2015; Tremblay et al., 2014; Yancey et al., 2010; Global Observatory for Physical Activity, 2017; World Health Organization, 2007c, 2007d; European Physical Activity Focal Points Network, 2015) of the instruments. Items about policy *processes* are included in 44% (n = 7; Bull et al., 2004a; Bellew et al., 2008; Shephard et al., 2004; Rütten et al., 2010; Bull et al., 2015; World Health Organization, 2007c, 2003) as well as items about *political will* (Bellew et al., 2008; Rütten et al., 2012; Shephard et al., 2004; Bull et al., 2015; Tremblay et al., 2014; Yancey et al., 2010; World Health Organization, 2007c). Items about *availability* of

PA policies are included in 38% (n = 6; Shephard et al., 2004; Bull et al., 2015; Ramirez Varela et al., 2016; Global Observatory for Physical Activity, 2017; World Health Organization, 2007d; European Physical Activity Focal Points Network, 2015) of the instruments. Items about *effects* of PA policies are the least represented, as only three instruments (19%) include them (Rütten et al., 2010; Yancey et al., 2010; World Health Organization, 2007d).

6.4. Discussion

This is the first systematic review of instruments for the analysis of national PA and SB policies. Although a relatively large number of instruments was identified, none of them cover all elements needed for a comprehensive analysis of PA/SB policy according to the CAPPA framework. Moreover, data on some important aspects of PA/SB policy, including *unwritten formal statements*, *informal policies*, the *termination* stage, and the *succession* stage cannot be collected by any of the instruments.

All the instruments identified in the current review included items about PA policy, whilst only two asked about SB policy (Bull et al., 2015; Global Observatory for Physical Activity, 2017). Research on SB is a much younger field than PA research. Interest in SB as a health risk factor has been developing since 2000 (Pedišić et al., 2017). While the body of evidence on determinants, prevalence, trends, and health outcomes of SB is large and rapidly growing, the research on SB policies is still in its infancy (Klepac Pogrmilovic et al., 2018). Given the wide recognition of the importance of SB as a health risk factor, this area requires further development of instruments or modification of existing ones to allow for the analysis of SB policies.

The included instruments contain items for auditing or assessment of policy. Policy auditing may be considered a prerequisite for policy assessment, as it is important to find out which aspects of policy exist before they can be assessed (Klepac Pogrmilovic et al., 2019a). Two included instruments contain only items for PA policy assessment, implying that if they were to be used, policy auditing first needs to be done using some other instrument (Tremblay et al., 2014; Yancey et al., 2010). In order to thoroughly understand PA/SB policies it would be beneficial if they were first audited and then

assessed. Therefore, having matching items for both these purposes in a single instrument would allow for an easier and more straightforward analysis and interpretation of results. This potentially useful feature has not been found in any of the included measurement tools.

A comprehensive approach that integrates policies across settings and sectors is considered essential to achieve substantial increases in PA at the population level (Bellew et al., 2011). Cross-sectoral approaches to policy-making may assist in positioning PA promotion on the agendas of different policy levels and policy sectors (Rütten et al., 2016). In the PA policy audit of seven European countries, performed using the HEPA PAT, one of the conclusions was that supportive PA-related policies were evident in the health, education, and sport sectors, but that more opportunities should be created for supportive policies in other sectors (Bull et al., 2014b). The majority of included instruments in this review do not ask about specific sectors. Interestingly, tourism is the least represented sector, addressed in only one instrument (Bull et al., 2015). Although some authors suggest that this sector may have great potential to contribute to PA promotion (Szczechowicz, 2012), this has clearly not yet been sufficiently recognised in instruments for PA policy research.

Formal written policies are, by far, the most represented type of policy in the available instruments. Accordingly, a systematic review found that *formal written policies*, were the most commonly analysed type of national PA/SB policy globally (Klepac Pogrmilovic et al., 2018). Items about *written standards and guidelines* and *formal procedures* are also well represented in the instruments. By contrast, in the available instruments no attention has been given to *unwritten formal statements* and *informal policies*. Including *unwritten formal statements* in the analysis of national PA/SB policy could bring additional insights into the comprehensive decision-making processes. As already recognised by Schmid et al. (2006) *informal policies* are "considered to be part of culture rather than explicit policy and not a primary focus of initial physical activity policy research". Rütten at al. (2012) based their instrument on a broader definition of policy stating that, besides formal statements and procedures, policy also includes informal procedures, rationales for action, and arrangements. However, this was not explicitly reflected in the instrument's items.

In political science, usually at least five stages are mentioned as crucial for understanding the full life circle of a policy and making sense of the policy process as a whole (Cairney, 2012; World health Organization, 2005). Within most reviewed instruments only a partial, three-stage policy cycle is inquired about, including the development of policy (*formulation* stage), policy *implementation* and the *evaluation* stage. We found only one instrument that includes an item on the *endorsement*/*legitimisation* stage of PA policies, which is not surprising given there does not seem to have been much interest in this particular aspect of policy in previous research in this field (Klepac Pogrmilovic et al., 2018). It is also possible, however, that the selection of research topics has been determined by the availability of measures. The *agenda setting* and *maintenance* stages are addressed in only a few instruments, while none of the instruments address the *termination* and *succession* stages. Analysing PA/SB policy in the context of its full policy cycle, from agenda setting to the termination or succession stage, is important to gain a more thorough understanding of the whole PA/SB policy-making process.

The majority of instruments are focused on policy *content* and the *actors* involved in policy processes. Some of the most common items on *actors* across the instruments are focused on leadership, coordination mechanisms, and organisational structure for PA promotion. Some of the most common items related to policy *content* are about the target groups and policy's specific goals and objectives. Only a few instruments ask about *availability* of PA/SB policies, that is, analysis of whether a specific PA/SB policy exists or not (Klepac Pogrmilovic et al., 2019a). With regard to the analysis of *processes* related to PA/SB policy, instruments that include relevant items are mainly focused on the processes of collaboration and/or consultation regarding PA policy. However, a detailed analysis of *processes* can be performed with very few instruments. For example, little attention has been given to actions and interrelationships between various actors and to formal processes during the development and implementation of policy. Besides, none of the instruments ask about the power relationship in different processes.

The *context* surrounding policy is addressed in the majority of the instruments and the respective items focus on the budget/financial resources and political will/support regarding policy implementation. Assessing the national policy context is a significant

first step to better PA policy (Bull et al., 2014b). However, broader, country-specific context such as religious, social or other values relevant for PA promotion, dominant ideology, and the nature of political systems, was addressed by very few instruments. An examination of a narrow context specifically focused on economic and political circumstances relevant for PA policy may be misleading. If, for example, a researcher does not take into account the dominant values of a country, he/she may be missing the "full picture" relevant to understanding how PA promotion in that country really works.

Analysing political, public health, social, economic, and/or environmental impacts is one of the key aspects of policy analysis. However, we found only a few instruments that include items about the *effects* of PA policy. This aspect of PA policy analysis may have been neglected because the effects of PA policies can be complex and challenging to measure. In 2006, the Centers for Disease Control and Prevention (CDC) highlighted that their "first priority" for future research was "to develop better tools to assess the effects of policies" (Schmid et al., 2006). Milton and Bauman also noted that evaluating the effectiveness of PA policy is important to inform future policy development (2015a). Such endeavours could be supported by the development of instruments specialized for analysing effects of PA and SB policies.

6.4.1. Recommendations for the use of instruments for PA/SB policy analysis

We suggest to future users of the instruments, such as policy analysts, policymakers, and other stakeholders, to first use the CAPPA framework as a "road map" to determine a more specific "route" to answer their research question (Klepac Pogrmilovic et al., 2019a). This can help to inform decisions on which particular instrument best meets their needs. All instruments assessed in this review have advantages and disadvantages.

If a comprehensive PA policy analysis needs to be done, *Health-enhancing physical activity policy audit tool (HEPA PAT)* would be the most suitable instrument. Using such a comprehensive instrument has advantages in that it can: (i) provide a deeper understanding of the current state of national PA/SB policies; (ii) lead to a more detailed insight on what needs to be changed in order to improve policy development and/or implementation. On the other hand, using a comprehensive instrument usually means longer data collection which may slow down the process of policy analysis.

Also, once the analysis is finally completed it may already be outdated. According to some experts who are currently using HEPA PAT, if undertaken by a single researcher, the process can take up to more than a year. Therefore, we believe this instrument is especially suitable for an official governmental audit of national PA/SB policy, where a team of people is available to work on collecting and analysing the data.

While the HEPA PAT does have one assessment-type question, it is more suitable for an *audit* than for *assessment*. Therefore, for *assessment* purposes, we recommend using the *Analysis of Determinants of Policy Impact (ADEPT) Model* (Rütten et al., 2012; Rütten et al., 2010). This instrument is especially suitable for researchers who wish to conduct interviews with policy makers. However, the instrument does not mention SB policies, and it relies on a broad definition of *policy,* which may not be suitable for some researchers who want to use a narrower definition.

It may not always be practical to conduct a comprehensive analysis of PA policy. In such cases, a less comprehensive instrument may need to be considered; albeit on account of gathering less detailed information about PA/SB policy. If time or capacity is limited we recommend using the *GoPA! Policy Inventory* (Global Observatory for Physical Activity, 2017). It contains only ten questions and is based on: (i) HEPA PAT – version 2 (Bull et al., 2015); and (ii) the *Questionnaire on the monitoring framework for the implementation of policies to promote health-enhancing physical activity in the EU and WHO European Region* 2015 (World Health Organization, 2015).

Some of the instruments are not structured as questionnaires. An example are the eight policy principles for the promotion of healthy diets and physical activity developed by the WHO (World Health Organization, 2003). If needed for the purpose of data collection, such sets of principles can be easily transformed into questionnaire items. We provided sample questions derived from the WHO's set of principles in Additional file 3. It should be noted, however, that these sample questions, have not been developed by the authors of the original instrument and their measurement properties have not been assessed. These sample questions have been developed exclusively for the purpose of this review, to help readers understand how a set of criteria can be transformed into a format suitable for data collection. Depending on their study design, researchers may prefer to develop different questions and use different types of

response scales. In any case, it would be important to conduct a study of measurement properties of such newly developed questions before starting the data collection.

All of these recommendations are an informed opinion of the present authors and should not be taken as an exclusive suggestion to use one instrument over another. The final decision should be left to users to independently asses all instruments and decide which of them is the most suitable for their needs. Table 4 and Additional file 2 can help to facilitate this process.

6.4.2. Towards standardisation of PA/SB policy analysis

The reviewed instruments differ considerably in their structure, comprehensiveness, and aspects of policy they inquire about. This is not surprising, as there is still no consensus among political scientists on what is defined as 'policy' and what constitutes a good policy analysis. Somewhat surprising, however, is the fact that there were large discrepancies even between the instruments developed by the same organisation and/or the same group of authors. This clearly shows that further efforts are needed towards standardisation of PA/SB policy analysis. Despite the large differences between instruments, some themes such as funding, specific target groups, political leadership and coordination, multi-sectoral approaches, evaluation, surveillance/monitoring, setting specific goals for PA promotion, and involvement of various stakeholders in PA policy were found in most of them. This is promising as it suggests there is a certain level of agreement between researchers about items that are critical for conducting a PA/SB policy analysis. However, there are a number of reasons for conducting policy analysis and different instruments have been developed for different purposes. Differences between questionnaire items and conceptualisations of PA/SB policy can negatively affect the comparability of findings across studies. Nonetheless, diversity in methodological approaches may sometimes be considered desirable, particularly in younger fields like SB policy research, because it may serve as a catalyst for academic discussions and facilitate the search for optimal solutions, whereas advancing to standardisation too soon might hinder the development of some novel and potentially valuable methods. Therefore, a balanced approach between heading towards standardisation and allowing for diversity in methodological approaches may be a good way to progress PA/SB policy research.

6.5. Strengths and limitations of the review

The main strengths of this systematic review are that: (i) the search was performed through various bibliographic databases, search engines, and websites, as well as through the reference lists of all included publications, which reduced the possibility of missing relevant studies; (ii) we employed an inclusive search syntax and broad eligibility criteria, which allowed us to find and review various types of instruments that may be used for PA/SB policy analysis; (iii) the assessment of eligibility of studies, as well as the data extraction from the studies, was done in duplicate, which reduced the likelihood of human error and subjectivity; and (iv) we based our data extraction on a conceptual framework.

This systematic review is also subject to several limitations. Even though the search was done with no language restrictions we included only publications with abstracts and/or full-texts in English, which may have caused the exclusion of relevant studies. We focused only on national-level policies, but we acknowledge that some instruments included in this review may also be used to analyse policies on other levels. We did not conduct a formal quality assessment of the studies and/or instruments, due to the fact that included studies varied in their aims and methods. Nevertheless, we provided a general assessment of the instruments and the strengths and limitations of various approaches employed in the instruments.

6.6. Conclusions

There is a range of different instruments available that can be used for analysing PA policy, whilst only two instruments include questions about SB policy. None of the instruments allow for the analysis of all the relevant components of national PA/SB policy. Some important elements of PA policy analysis such as the *tourism* and *research* sectors, the *agenda setting* and *endorsement/legitimisation* stages, and the *effects* of policy are addressed by only a few instruments. Moreover, none of the instruments address *unwritten formal statements*, *informal policies*, and the *termination* and *succession* stages of the policy cycle. Thus, designing new instruments or adapting existing ones is needed to allow for a more thorough analysis of national PA and SB

policies. Given that policy analysis covering all important components of PA/SB policy may be extremely time-consuming, a way forward might be to develop a set of complementary instruments, with each tool collecting detailed information about a specific aspect of PA and SB policy.

Table 4. Instruments for the analysis of physical activity and/or sedentary behaviour policies and their characteristics

Instrument	Author(s) and publication	Characteristics					
		Includes items on PA, SB, or both	Purpose of analysis	Policy sector	Type of policy	Stage of policy cycle	Scope of analysis
Policy principles for the promotion of healthy diets and physical activity	(World Health Organization, 2003)	PA	Auditing Assessment	None	Formal written policies	Formulation Implementation Evaluation	Processes Actors Content
Criteria for successful policy and action plans on physical activity	(Bull et al., 2004a; Bull et al., 2004b; Schöppe et al., 2004)	PA	Auditing Assessment	None	Formal written policies Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Content
A Comprehensive Physical Activity Policy Framework	(Shephard et al., 2004)	PA	Auditing Assessment	Education Health Sport Recreation and leisure Transport Urban/rural planning and design Work and employment	Formal written policies Formal procedures	Agenda setting Formulation Implementation Evaluation	Availability Context Processes Actors Political will Content
Elements of national policy documents	(Branca et al., 2007)	PA	Auditing Assessment	Education Health Transport Urban/rural planning and design Work and employment Public finance Research	Formal written policies	Formulation Implementation Evaluation	Context Actors Content
Key principles that should guide member states in the development of national physical activity strategies	(World Health Organization, 2007d)	PA	Auditing Assessment	None	Formal written policies Written standards Formal procedures	None	Availability Context Actors Content Effects
Important elements of successful physical activity policies and plans	(World Health Organization, 2007c)	PA	Auditing Assessment	None	Formal written policies Written standards	Implementation Evaluation	Context Processes Actors Political will Content
HARDWIRED criteria for successful national physical activity policy	(Bellew et al., 2008)	PA	Auditing Assessment	None	Formal written policies Written standards	Formulation Implementation Evaluation	Context Processes Actors Political will

					Formal procedures		Content
Eight aspects identified as being relevant for effective physical activity policies	(Daugbjerg et al., 2009)	PA	Auditing	None	Formal written policies Formal procedures	Formulation Endorsement/ legitimisation Implementation Evaluation	Actors Content
A graphical, computer-based decision-support tool to help decision makers evaluate policy options relating to physical activity	(Yancey et al., 2010)	PA	Assessment	None	None	Formulation Implementation	Political will Context Effects
Analysis of Determinants of Policy Impact (ADEPT) Model	(Rütten et al., 2010; Rütten et al., 2012)	PA	Auditing Assessment	None	Formal written policies Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Political will Content Effects
Categories for the content analysis of policies	(World Health Organization, 2011; Christiansen et al., 2014)	PA	Auditing	None	Formal written policies	Formulation Implementation Evaluation Maintenance	Actors Content
Health-enhancing physical activity (HEPA) policy audit tool (PAT)	(Bull et al., 2014a; Bull et al., 2014b; Bull et al., 2014c; Bull et al., 2014d; Bull et al., 2015)	PA and SB	Auditing Assessment	Education Environment Health Sport Recreation and leisure Tourism Transport Urban/rural planning and design Work and employment Public finance Research	Formal written policies Written standards Formal procedures	Formulation Implementation Evaluation Maintenance	Availability Context Processes Actors Political will Content
Government Strategies and Investments indicator for Active Healthy Kids Report cards	(Tremblay et al., 2014)	PA	Assessment	Public finance	None	Agenda setting Formulation Implementation Evaluation	Context Actors Political will

Questionnaire on the monitoring framework for the implementation of policies to promote health-enhancing physical activity in the EU and WHO European Region 2015	(World Health Organization, 2015; European Physical Activity Focal Points Network, 2015)	PA	Auditing	Education Environment Health Sport Recreation and leisure Transport Urban/rural planning and design Work and employment Public finance	Formal written policies Written standards Formal procedures	Implementation	Availability Context Actors Content
Surveillance and Policy status indicators for GoPA Country Cards	(Ramirez Varela et al., 2016; Ramirez Varela et al., 2017; Ramirez Varela et al., 2017)	PA	Auditing	None	Formal written policies Formal procedures	None	Availability
GoPA Policy Inventory 1.0 2017	(Global Observatory for Physical Activity, 2017)	PA and SB	Auditing	Education Environment Health Sport Recreation and leisure Transport Urban/rural planning and design	Formal written policies Written standards Formal procedures	Maintenance	Availability Context Actors Content

PA: Physical Activity, SB: Sedentary Behaviour

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DECLARATION OF CO-AUTHORSHIP AND CO-CONTRIBUTION: PAPERS INCORPORATED IN THESIS

This declaration is to be completed for each conjointly authored publication and placed at the beginning of the thesis chapter in which the publication appears.

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2. CANDIDATE DECLARATION

I declare that the publication above meets the requirements to be included in the thesis as outlined in the HDR Policy and related Procedures – policy.vu.edu.au.

[redacted] 25.09.2020

Signature Date

3. CO-AUTHOR(S) DECLARATION

In the case of the above publication, the following authors contributed to the work as follows:

The undersigned certify that:

1. They meet criteria for authorship in that they have participated in the conception, execution or interpretation of at least that part of the publication in their field of expertise;
2. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

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Michael Pratt	4	- contributed to the development of the inventory, reading, writing and approving the manuscript		19.06.2020
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Stuart J.H. Biddle (supervisor)	4	- contributed to the development of the inventory, reading, writing and approving the manuscript		19.06.2020
Zeljko Pedisic (principal supervisor)	8	- contributed to the study design, development of the inventory, support in data analysis and reading writing and approving the manuscri		19.06.2020

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7. National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness[4]

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Abstract

Background: Evidence on current, national physical activity (PA) and sedentary behaviour (SB) policies is limited. We, therefore, analysed availability, comprehensiveness, implementation, and effectiveness of PA and SB policies internationally.

Methods: In this cross-sectional study, Global Observatory for Physical Activity (GoPA!) Country Contacts from 173 countries were asked to provide data on their national PA and SB policies by completing GoPA! Policy Inventory. Data were collected for 76 countries (response rate = 44%).

Results: Formal written policies for PA and SB were found in 92% (95% confidence interval [CI]: 86, 98) and 62% (95% CI: 50, 75) of countries, respectively. Sixty-two percent (95% CI: 51, 73) of countries have national PA guidelines, while 40% (95% CI: 29, 52) have SB guidelines. Fifty-two (95% CI: 40, 64) and 11% (95% CI: 3, 19) of countries have quantifiable national targets for PA and SB, respectively. The most represented ministries/departments involved in the promotion of more PA and/or less SB were in the sport (reported by 99% countries; 95% CI: 96, 100), health (97%; 95% CI: 94, 100), education (94%; 95% CI: 88, 100), and recreation and leisure (85%; 95% CI: 71, 99) sectors. The median score (0-10) for the comprehensiveness of PA and SB policies was 4 (95% CI: 4, 5) and 2 (95% CI: 2, 3), respectively. For PA and SB policy implementation it was 6 (95% CI: 5, 6). For the effectiveness of PA and SB policies it was 4 (95% CI: 3, 5) and 3 (95% CI: 2, 4), respectively. PA and SB policies were generally best developed in high-income countries and countries of European and Western-Pacific regions.

Conclusions: Most of the included countries have PA policies, but their comprehensiveness, implementation, and effectiveness are generally low-to-moderate. SB policies are less available, comprehensive, implemented, and effective than PA policies. PA and SB policies are better developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of European and Western-Pacific regions, compared with other world regions. More investment is needed in development and implementation of comprehensive and effective PA and SB policies, particularly in low- and lower-middle-income countries.

Key words: physical activity, sedentary behaviour, global, assessment, audit, policies

7.1. Background

Insufficient physical activity (PA) and high sedentary behaviour (i.e. activities in sitting or reclining posture requiring low energy expenditure; SB) are jointly responsible for around 13% of deaths globally (Lee et al., 2012; Patterson, McNamara, Tainio, de Sá, Smith et al., 2018). Alongside smoking, unhealthy diet, and excessive alcohol consumption, insufficient PA and SB are key behavioural risk factors for the development of noncommunicable diseases (World Health Organization; González, Fuentes, & Márquez, 2017). Insufficient PA is associated with a significant economic burden (Ding et al., 2016). Its overall direct cost to worldwide healthcare systems is estimated to be around 53.8 billion international dollars (Ding et al., 2016). Evidence on the considerable public health and economic benefits that could be achieved by increasing PA in the population has incentivised governments around the world to develop PA policies (Klepac Pogrmilovic et al., 2018).

Research around PA policy is developing, and some data on PA policy are available for 168 countries (Klepac Pogrmilovic et al., 2018). SB policy research is a relatively new area (Klepac Pogrmilovic et al., 2018), and for most countries evidence is lacking for the development of SB policies (Klepac Pogrmilovic et al., 2018). Research on national-level PA and SB policies may contribute to: (i) evidence-based development of new PA and SB policies; (ii) better implementation and evaluation of existing PA and SB policies; (iii) achieving sustainable reforms within the health, education, sport, and other sectors, particularly in regard to the promotion of more PA and less SB; (iv) raising awareness among policy makers and other public health stakeholders about existing challenges, gaps, and prospects in national-level PA promotion; (v) important debates between researchers and policymakers on existing and future PA and SB policies (Althaus et al., 2013; Bull et al., 2014b; Buse et al., 2005; Buse et al., 2009; Quade & Carter., 1989; Kohl et al., 2012; Schmid et al., 2006; Rütten et al., 2016; Walt et al., 1996; Walt & Gilson, 1994;).

For the past several decades, national and subnational governments, international organisations such as the World Health Organization (WHO), public health researchers, and non-governmental organisations have worked on various initiatives to make the promotion of more PA and less SB a public health priority. In 2018, the WHO

launched the *Global Action Plan on Physical Activity 2018–2030* urging countries around the world to implement policy actions that will support efforts to reduce levels of physical inactivity and SB and contribute to meeting the global target of a 15% relative reduction in the prevalence of insufficient PA by 2030 (World Health Organization, 2018b).

In 2012, the Global Observatory for Physical Activity (GoPA!) was established to monitor global progress in PA surveillance, research, and policy (Ramirez Varela et al., 2018b; Ramirez Varela et al., 2017). The GoPA! is a council of the International Society for Physical Activity and Health (Ramirez Varela et al., 2018b; Ramirez Varela et al., 2017). At the time when the GoPA! was established, little data on national PA surveillance, research, and policy were available that would allow for comparisons between different countries and world regions (Ramirez Varela et al., 2018b; Ramirez Varela et al., 2017). In 2015, the GoPA! issued PA profiles for 139 countries, the so-called "PA Country Cards" (Ramirez Varela et al., 2016). The data presented in the Country Cards were a valuable starting point towards a better understanding of the global progress on PA policies (Klepac Pogrmilovic et al., 2018). The first set of Country Cards included information on research, surveillance and on the availability of national action plans for PA (Ramirez Varela et al., 2016). Including comprehensiveness, implementation, and effectiveness of PA policies as well as SB policy became one of the goals for the Second set of Country Cards to be released by the end of 2020. Furthermore, national policies change over time; hence, information on PA and SB policies needs to the regularly updated (Klepac Pogrmilovic et al., 2018). Therefore, the aim of this study was to audit and critically assess the availability, comprehensiveness, implementation, and effectiveness of current national-level PA and SB policies globally.

7.2. Methods

7.2.1. Data collection and study sample

The data collection in this cross-sectional study took place from October 2019 to March 2020. GoPA! Country Contacts from 173 countries were invited to participate in the study and provide information on national PA and SB policies in their countries. All GoPA! Country Contacts were invited to participate in the survey, regardless of

whether their country had or did not have PA and SB policy. The GoPA! Country Contacts are an established group that were identified by the GoPA!: (i) using PubMed search of the PA literature; (ii) from the list of focal points of international networks for PA promotion; and (iii) from the list of focal points of the WHO regional offices. To be selected, Country Contacts needed to have established experience in the area of public health and PA as researchers, members of international networks for PA promotion or members of government institutions. More details about the selection of GoPA! Country Contacts can be found elsewhere (Ramirez Varela et al., 2016; Ramirez Varela et al., 2017). The *GoPA! Policy Inventory version 3.0* (Additional file 1), was distributed to the GoPA! Country Contacts as an online survey. Responses were obtained for a total of 76 countries (response rate = 44%), of which 51% were high-income, 28% upper-middle-income and 21% low and lower-middle-income. The study sample included countries from all six WHO regions. The most represented region was the European Region (38%), followed by the Region of Americas (22%), the African Region (12%), the Western Pacific Region (11%), the Eastern Mediterranean Region (11%), and the South-East Asia Region (5%). In 12 of the participating countries, we obtained separate responses from two Country Contacts. When their responses differed, we relied on the responses from the main Country Contact listed in the GoPA! Country Cards. Participation in the study was voluntary and all participants provided informed consent before responding to the survey questions. The study protocol was approved by the Victoria University Human Research Ethics Committee (ref: HRE19-057).

7.2.2. Policy variables

In the *GoPA! Policy Inventory version 3.0*, we used a broad definition of PA policy, as recommended in the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework (Klepac Pogrmilovic et al., 2019a). PA policy was "indicated by the totality of formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and informal policies (or lack thereof) that may directly or indirectly affect community- or population-level PA" (Klepac Pogrmilovic et al., 2019a). Given the large overlap between the PA and SB policy fields, it is suggested that the CAPPA framework can also be used for the analysis of SB polices (Klepac

Pogrmilovic et al., 2019a). Therefore, we used the same broad definition from the CAPPA framework for SB policy.

The *GoPA! Policy Inventory version 3.0* contains 20 questions about national PA and SB policies. The questionnaire was developed based on: the Health enhancing physical activity policy audit tool, version 2.0 (Bull et al., 2015); the monitoring framework from the European Union Recommendation on Health-Enhancing Physical Activity Across Sectors (Council of the European Union, 2013); the CAPPA framework; and a year long process of engagement of stakeholders (Klepac Pogrmilovic et al., 2019a). The questions on the *GoPA! Policy Inventory version 3.0* address the following elements of the CAPPA framework: *availability*; *formal written policies*; *written guidelines; formal procedures; actors*; *implementation;* and *effects* (Klepac Pogrmilovic et al., 2019a). Specifically, the questions focus on: the availability of national formal written PA and SB polices (e.g., policy documents, legislation, strategies, action plans); national PA and SB guidelines; national targets for PA and SB; health surveillance or monitoring systems that include measures of PA and SB; ministries/departments involved in the promotion of more PA and less SB; and comprehensiveness, implementation and effectiveness of national PA and SB policies. When referring to the *availability of PA and SB policy*, we considered not only the availability of formal written PA and SB policies but also the availability of written guidelines, quantifiable targets, and national PA and SB surveillance or monitoring, because these are indicators of a government's commitment or intention to support the promotion of more PA and less SB in the population (Klepac Pogrmilovic et al., 2019a). The questions on comprehensiveness, implementation, and effectiveness of policies had ordinal response scales (0-10), with a higher value on the scale representing a better score. Detailed definitions of comprehensiveness, implementation and effectiveness of PA and SB policies are provided in Additional file 1.

7.2.3. Data analysis

The data were analysed using IBM Statistical Package for the Social Sciences (SPSS), version 23 (SPSS Inc., an IBM Company, Chicago, IL, USA). Ordinal data on comprehensiveness, implementation, and effectiveness of policy were presented using medians (and their 95% confidence intervals [CI]) and interquartile ranges. Categorical

data were presented as percentages and their 95% confidence intervals. Data were analysed for the whole sample and stratified by WHO regions and country's income level (GNI per capita, calculated using the Atlas method) according to the World Bank (2019). Differences in PA and SB policy between low-, middle, and high-income countries and between the WHO regions were analysed using the Kruskal-Wallis test, for ordinal variables, and chi-square test for categorical variables. The percentage of missing data was relatively low (range across variables: 0% – 9.2%, mean: 3.3%). In the analyses, we used pairwise deletion of missing data. We considered $p < 0.05$ as a threshold for statistical significance.

7.2.4. Categorisation of countries

The list of 218 economies from June 2019 provided by the World Bank was used as the list of countries/states/economies (World Bank, 2019). The authors are mindful of the fact that some countries/states/economies on the World Bank's list cannot be termed as "countries" because of unclear legal and/or political status. Nevertheless, for brevity purposes, we used the term "countries" as an abbreviation for "countries/states/economies". In order to be consistent with previous analyses of national PA and SB policies globally, both by GoPA! (Ramirez Varela et al., 2016) and other international organisations for PA promotion (Tremblay et al., 2014; Tremblay et al., 2016), we separately analysed the four United Kingdom home nations; namely, England, Northern Ireland, Scotland, and Wales. The countries were divided into three groups by income level: high-income; upper-middle-income; and low and lower-middle-income, in accordance with the categorisation provided by the World Bank (2019). The two lowest income groups were merged into one, because of a small number of low-income countries in the sample. The countries were also categorised into the six WHO world regions: African Region; European Region; Eastern Mediterranean Region; Region of the Americas; South-East Asia Region; Western Pacific Region.

7.3. Results

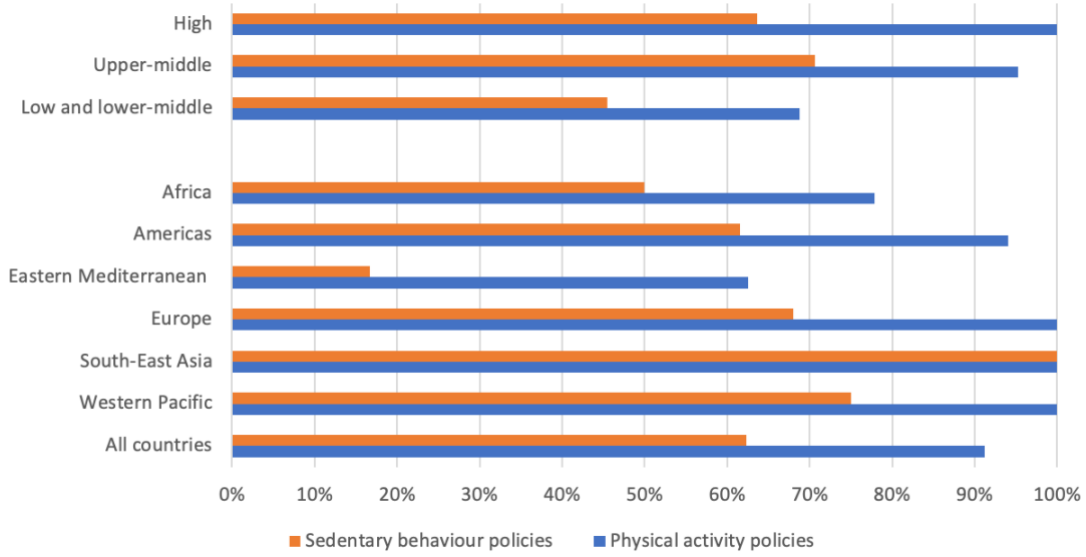
7.3.1. Availability of PA and SB policies

Formal written PA and SB policies

We found that 92% (95% CI: 86, 98) of countries have national policy documents, legislation, strategies, or action plans that outline the government's intention to increase PA. National policy documents, legislation, strategies or action plans that outline the government's intention to tackle SB were found in 62% (95% CI: 50, 75) of countries. We found a total of 251 PA and SB policies. Sixty-eight per cent of all policies were published between 2015 and 2020.

The availability of national policies that aim to increase PA and tackle SB across different groups by income level and world regions is summarised in Figure 14. We found significant differences in the availability of national policies to increase population PA between country groups by income level ($p < 0.001$) and between world regions ($p = 0.007$). We did not find a significant difference in the availability of national policies to tackle population SB by income level ($p = 0.396$) or by world region ($p = 0.135$).

Figure 14. Percentage of countries with PA and SB policies, by income level and world region

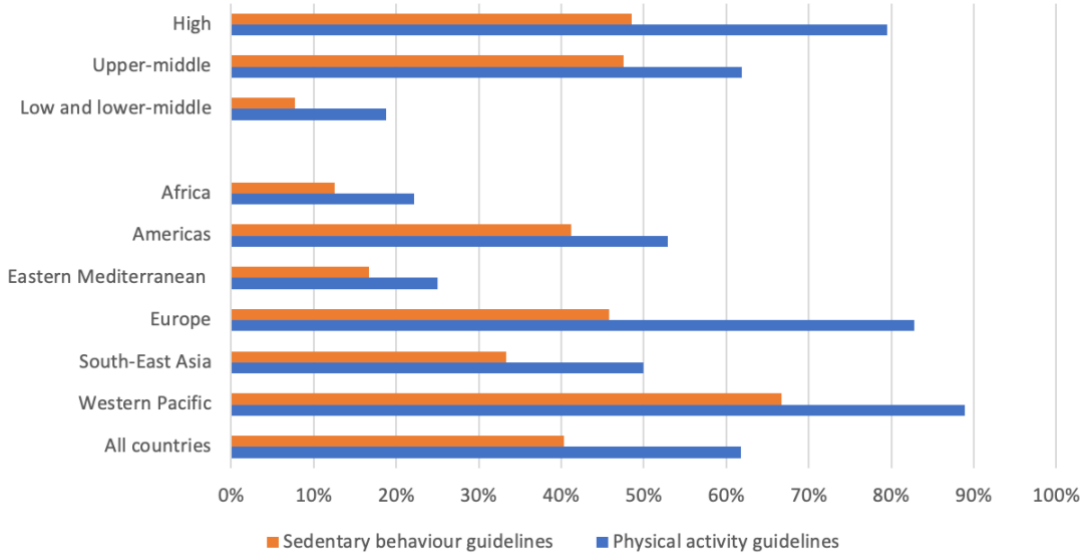


PA: physical activity, SB: sedentary behaviour

PA and SB guidelines

We found that 62% (95% CI: 51, 73) of countries have national PA guidelines, while 40% (95% CI: 29, 52) have guidelines for SB. The availability of national PA and SB guidelines across different income levels and world regions is summarised in Figure 15. We found significant differences in the availability of PA guidelines between country groups by income level ($p < 0.001$) and between world regions ($p = 0.002$). We also found a significant difference in the availability of SB guidelines between country groups by income level ($p = 0.028$). We did not find significant differences in the availability of SB guidelines by world regions ($p = 0.226$).

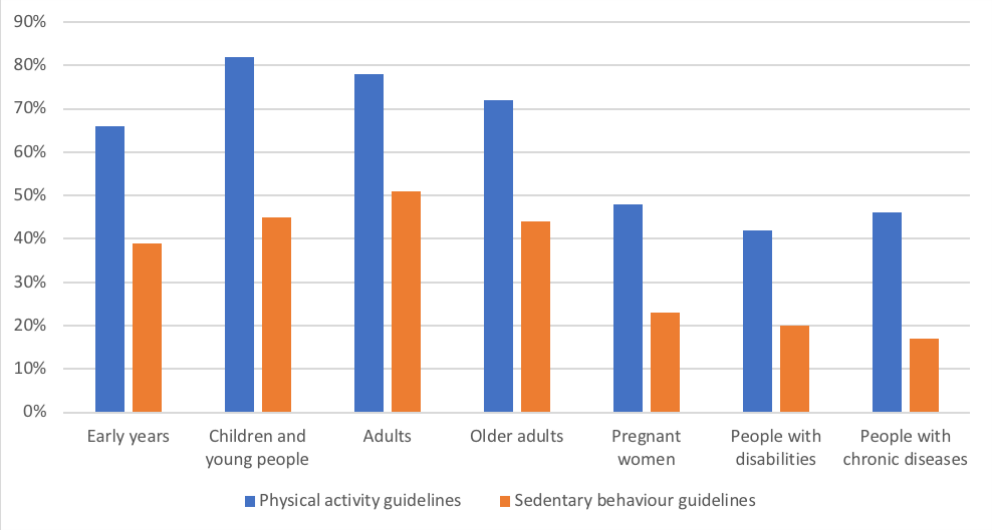
Figure 15. Percentage of countries with national PA and SB guidelines, by income level and world region



PA: physical activity, SB: sedentary behaviour

A large majority of countries have specific PA guidelines for *early years* (66%; 95% CI: 53, 79), *children and young people* (82%; 95% CI: 71, 92), *adults* (78%; 95% CI: 67, 89), and *older adults* (72%; 95% CI: 60, 84). About half of the countries have specific SB guidelines for *early years* (39%; 95% CI: 24, 54), *children and young people* (45%; 95% CI: 30, 60), *adults* (51%; 95% CI: 36, 67), and *older adults* (44%; 95% CI: 29, 59; Figure 16). Specific national PA and SB guidelines for pregnant women, people with disabilities, and people with chronic disease were less well represented.

Figure 16. Percentage of countries with specific national PA and SB guidelines for different target groups



PA: physical activity, SB: sedentary behaviour

National targets for PA and SB

The availability of quantifiable national targets for PA and SB across countries with different income levels and world regions is presented in Additional file 2. Overall, 52% (95% CI: 40, 64) and 11% (95% CI: 3, 19) of countries reported having quantifiable national targets for PA and SB, respectively. We found significant differences in the availability of quantifiable national targets for PA between country groups by income level ($p = 0.049$) and between world regions ($p = 0.027$). We did not find significant difference in the availability of quantifiable national targets for SB by income level ($p = 0.262$) or by world region ($p = 0.206$).

National PA and SB surveillance/monitoring

The percentages of countries with national health surveillance or monitoring system that include measures of PA and SB, by income level and world regions, are presented in Additional file 3. Overall, 71% (95% CI: 60, 81) of countries have a national health surveillance or monitoring system that includes measures of PA, and 51% (95% CI: 39, 63) of countries have a national health surveillance or monitoring system with measures of SB. We did not find significant differences in the availability of national health surveillance/monitoring systems that include measures of PA and SB between countries with different income levels or between world regions.

7.3.2. Ministries/departments involved in the promotion of more PA and less SB

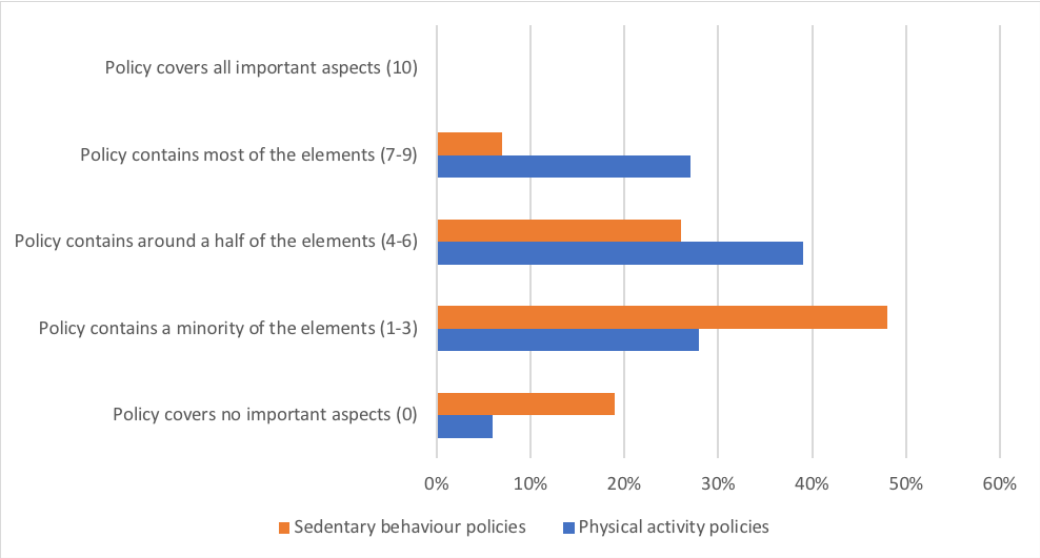
The most represented ministries or departments with an active role in the promotion of more PA and/or less SB were in the sectors of: *sport* (reported by 99% of countries; 95% CI: 96, 100); *health* (97%; 95% CI: 94, 100); *education* (94%; 95% CI: 88, 100); *recreation and leisure* (85%; 95% CI: 71, 99); and *research* (68% 95% CI: 26, 12). This was followed by the ministries or departments of *transport* (60%; 95% CI: 56, 74), *urban/rural planning and design* (60%; 95% CI: 45, 75), *tourism* (46%; 95% CI: 30, 62), *culture* (44%; 95% CI: 29, 59), *environment* (43%; 95% CI: 27, 58), *work and employment* (39%; 95% CI: 24, 54), and *public finance* (28%; 95% CI: 13, 42). The percentage of national ministries or departments involved in promotion of more PA and/or less SB are presented in Additional file 4.

7.3.3. Comprehensiveness of PA and SB policies

The distribution of national PA and SB policies according to their level of comprehensiveness is presented in Figure 17. We found that PA policy in 39% (95% CI: 28, 51) of countries includes only around half of the important elements of a comprehensive approach (the list of elements can be found in Additional file 1), while in 27% (95% CI: 17, 37) of countries PA policy contains most of the important elements. A low level of comprehensiveness was found for PA policy in 28% (95% CI: 18, 39) of countries, while in 6% (95% CI: 0.3, 11) of countries PA policy covers no important elements. No countries reported having PA policy that includes all important elements. The median score for the comprehensiveness of PA policy was 4 (95% CI: 4, 5).

In most of the included countries, SB policy was assessed as having low comprehensiveness (48%; 95% CI: 35, 62) or as covering no important aspects (19%; 95% CI: 8, 29). Twenty-six per cent (95% CI: 14, 38) of countries reported having SB policy that includes only around half of important elements, while in 7% (95% CI: 0.4, 14) of countries SB policy contains most of the important elements. No countries reported having SB policy that includes all important elements. The median score for the comprehensiveness of SB policy was 2 (95% CI: 2, 3).

Figure 17. Distribution of national PA and SB policies according to their level of comprehensiveness



PA: physical activity, SB: sedentary behaviour

The level of comprehensiveness of PA and SB policies across countries with different income levels and world regions is presented in Table 5. We found significant differences in the comprehensiveness of PA policy between country groups by income level (p = 0.030) and between world regions (p = 0.049). We did not find significant differences in the comprehensiveness of SB policy by income level (p = 0.157) or by world region (p = 0.412).

Table 5. Level of comprehensiveness of national PA and SB policies, by income level and world region

Category	Physical activity policy			Sedentary behaviour policy		
	Median (IQR)	95% CI	*p*	Median (IQR)	95% CI	*p*
Income						
High	5 (3)	4, 7	0.030	2 (3.5)	1, 3.5	0.157
Upper-middle	4 (3)	3, 5		2.5 (3.25)	2, 4.5	
Low and lower-middle	2 (3.25)	1, 4		2 (2)	1, 3	
Region						
Africa	2.5 (3.75)	1, 5	0.049	2 (2)	1, 3	0.412

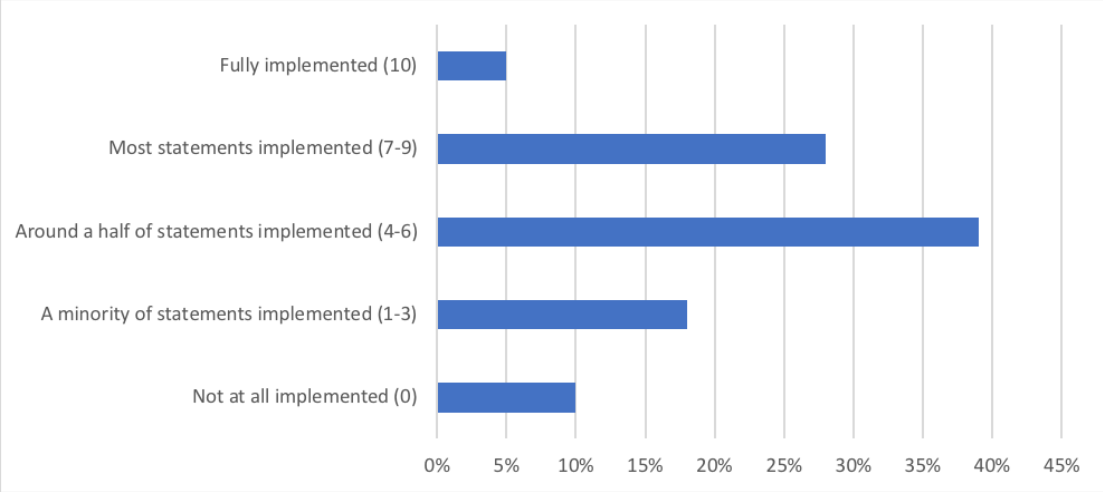
Americas	4 (3.75)	2, 5		2 (3.5)	1, 4	
Eastern Mediterranean	3 (5)	0, 5		1 (3.5)	0, 3.6	
Europe	5 (3)	4, 7		3 (3)	1, 4	
South-East Asia	6.5 (4.75)	2.7, 10		6 (4)	n/a	
Western Pacific	6 (5)	1, 8		2.5 (4.25)	0.2, 4.8	
All countries	4 (4)	4, 5	/	2 (3)	2, 3	/

PA: physical activity, SB: sedentary behaviour, IQR: interquartile range, CI: confidence interval for median, *p*: *p*-value for the difference between groups from Kruskal-Wallis test, n/a: number of countries too small to calculate CI

7.3.4. Implementation of PA and SB policies

The level of implementation was assessed for a total of 150 national PA and SB policies. The percentage of PA and SB policies according to their level of implementation is presented in Figure 18. For 39% (95% CI: 27, 52) of policies, we found that only around a half of the statements were implemented, while for 28% (95% CI: 17, 39) of policies most statements were implemented. A low level of implementation was found for 18% (95% CI: 8, 28), while 10% (95% CI: 2, 17) of policies were not implemented at all. Only a few policies (5%; 95% CI: 0, 10) were fully implemented. The median score for PA and SB policy implementation was 6 (95% CI: 5, 6).

Figure 18. Distribution of PA and SB policies according to their level of implementation



PA: physical activity, SB: sedentary behaviour

The level of implementation of PA and SB policies across countries with different income levels and world regions is presented in Table 6. We did not find a significant difference between the level of PA and SB policy implementation by income level (p = 0.059) or by world region (p = 0.166).

Table 6. Level of implementation of PA and SB policies, by income level and world region

Category	Median (IQR)	95% CI	*p*
Income			
High	6 (3)	5, 7	
Upper-middle	6 (4)	3, 7	0.059
Low and lower-middle	4 (5)	0, 5	
Region			
Africa	5 (6)	0, 6	
Americas	6 (4.5)	3, 7.5	0.166
Eastern Mediterranean	2 (6)	0, 6.2	
Europe	6 (2.75)	5, 7	

South-East Asia	6 (2)	n/a	
Western Pacific	6 (4)	3, 9	
All countries	6 (4)	5, 6	/

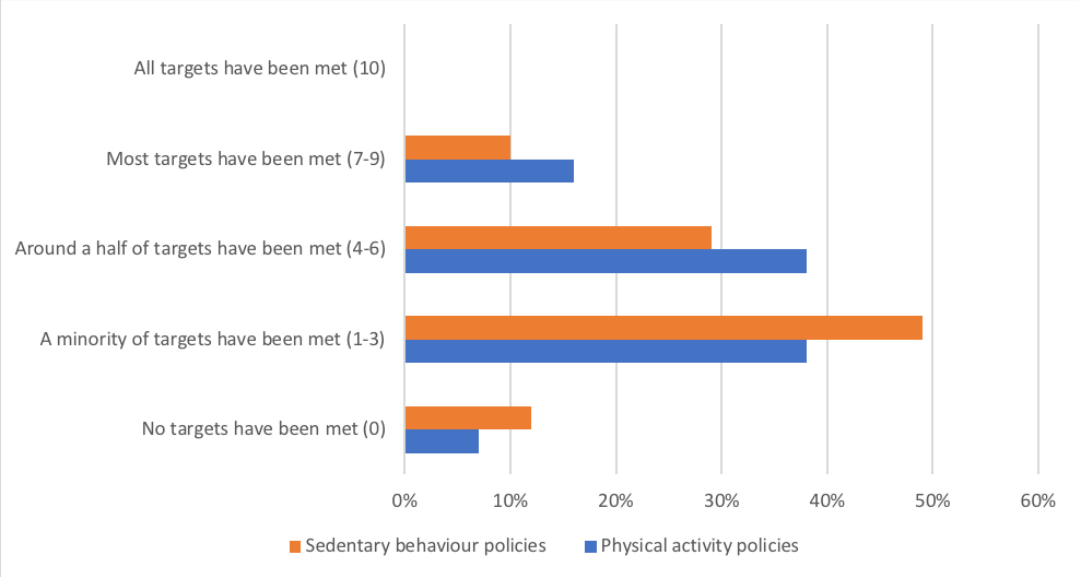
PA: physical activity, SB: sedentary behaviour, IQR: interquartile range, CI: confidence interval for median, *p*: *p*-value for the difference between groups from Kruskal-Wallis test, n/a: number of countries too small to calculate CI

7.3.5. Effectiveness of PA and SB policies

The distribution of national PA and SB policies according to their level of effectiveness is presented in Figure 19. We found that PA policy in 16% (95% CI: 7, 26) of countries was highly effective (i.e. most targets have been met), while in 38% (95% CI: 25, 51) of countries PA policy was moderately effective (i.e. around half of the targets have been met). A low level of effectiveness (i.e. a minority of targets have been met) was found for PA policy in 38% (95% CI: 25, 51) of countries, while in 7% (95% CI: 0.4, 14) of countries PA policy was not effective at all (i.e. no targets have been met). No countries reported having PA policy that was fully effective (i.e. all targets have been met). The median score for the effectiveness of PA policy was 4 (95% CI: 3, 5).

We found that SB policy in 10% (95% CI: 0.7, 19) of countries was highly effective (i.e. most targets have been met), while in 29% (95% CI: 15, 43) of countries SB policy was moderately effective (i.e. around half of the targets have been met). A low level of effectiveness (i.e. a minority of targets have been met) was found for SB policy in 49% (95% CI: 34, 64) of countries, while in 12% (95% CI: 2, 22) of countries SB policy was not effective at all (i.e. no targets have been met). No countries reported having SB policy that was fully effective (i.e. all targets have been met). The median score for the effectiveness of SB policy was 3 (95% CI: 2, 4).

Figure 19. Distribution of PA and SB policies according to their level of effectiveness



PA: physical activity, SB: sedentary behaviour

The level of effectiveness of PA and SB policies across countries with different income levels and world regions is presented in Table 7. We found significant differences in the effectiveness of PA policy by income level (p = 0.004). We did not find significant differences in the effectiveness of PA policy by world regions (p = 0.175). We also did not find significant differences in the effectiveness of SB policy by income level (p = 0.202) or by world region (p = 0.265).

Table 7. Level of effectiveness of PA and SB policies, by income level and world region

Category	Physical activity policy			Sedentary behaviour policy		
	Median (IQR)	95% CI	*p*	Median (IQR)	95% CI	*p*
Income						
High	5 (3)	3, 5		3.5 (2.75)	3, 5	
Upper-middle	5 (3)	3.5, 6	0.004	3 (3.25)	2, 5	0.202
Low and lower-middle	3 (3.5)	0.5, 4		2 (3)	0, 3	

Region						
Africa	2 (4.25)	1, 6		2 (3)	1, 4	
Americas	4 (3)	2, 5		3 (3)	1, 4	
Eastern Mediterranean	3 (3.5)	0.4, 5.6		2 (2)	n/a	
Europe	5 (4)	4, 6		5 (3)	3, 5	
South-East Asia	5 (2)	n/a	0.175	5 (2)	n/a	0.265
Western Pacific	3 (4)	0, 6.2		3 (2)	n/a	
All countries	4 (2)	3, 5	/	3 (3.5)	2, 4	/

PA: physical activity, SB: sedentary behaviour, IQR: interquartile range, CI: confidence interval for median, *p*: *p*-value for the difference between groups from Kruskal-Wallis test, n/a: number of countries too small to calculate CI

7.4. Discussion

In this international study conducted in 76 countries, we found that most of the included countries have formal written PA policies, guidelines for PA, health surveillance or monitoring systems that include measures of PA, and quantifiable national targets for PA. However, the levels of comprehensiveness, implementation, and effectiveness of PA policies were generally found to be low-to-moderate. Compared with PA policies, national SB policies were generally less available and comprehensive. They were also less implemented and effective. PA and SB policies were generally more developed in high-income countries and countries of European and Western-Pacific regions.

7.4.1. Availability of PA and SB policies

Formal written PA and SB policies

We found that formal written PA policies are available in most of the included countries, which is consistent with findings of previous studies (World Health Organization, 2016; Sallis et al., 2016). This is significant progress from the mid 2000s, when only around 29% of countries had PA policies (Sallis et al., 2016). However, our findings showed significant differences in the availability of national PA policies between country groups by income level and by world regions. The prevalence of insufficient physical activity is higher in high-income countries than in middle-income and low-income countries (Guthold, Stevens, Riley, & Bull, 2018), which may partly

explain why the governments in high-income countries are more likely to prioritise investing in the development of PA policies. Furthermore, in many low- and middle-income countries there is still a lack of country and context specific research on PA and health (Vancampfort et al., 2017), which could be the reason for lower interest of policymakers to support the promotion of PA.

Low availability of formal written PA policies and PA guidelines may be especially problematic for the Eastern Mediterranean region. In addition to a high prevalence of noncommunicable diseases (World Health Organization, 2020a), this region has one of the highest physical inactivity and obesity rates in the world (Kulhánová et al., 2020). The call to focus more on developing national PA policies and implementation plans in the Eastern Mediterranean region from several years ago (World Health Organization, 2014a), is still justified.

The availability of SB policies was generally lower than the availability of PA policies. This finding is not surprising because public awareness of the potential adverse health outcomes of SB started to be systematically addressed no more than 20 years ago (Klepac Pogrmilovic et al., 2018; Klepac Pogrmilovic et al., 2019a). Most evidence on SB policies and other determinants of SB comes from research conducted in high-income countries (Klepac Pogrmilovic et al., 2018; Koyanagi, Stubbs, & Vancampfort, 2018). Due to differences in socio-cultural, political, environmental, and legal factors, there is a need for context-specific research on SB policies (Koyanagi et al., 2018). More research on SB and associated policies is warranted, because such research may facilitate the development of national SB policies.

PA and SB guidelines

Availability of national PA guidelines is a good indicator of national PA and SB policy, as it shows the government's intention to support the promotion of more PA and less SB. More effort needs to be put in the development of national SB guidelines, as they were less represented than PA guidelines. The low availability of SB guidelines might be because there is still an ongoing discussion within the research community on whether there is sufficient epidemiological evidence on the dose-response relationship between SB and health outcomes (Stamatakis et al., 2019; Chaput, Olds, & Tremblay, 2020). Furthermore, we found that the difference between high-income and low- and

lower-middle-income countries is particularly large in the availability of PA and SB guidelines. The fact that a large majority of low- and lower-middle-income countries do not have national PA and SB guidelines is concerning from a public health perspective. Greater investment is needed in the development or adoption of PA and SB guidelines in low- and lower-middle-income countries, to support their promotion of more PA and less SB in the population.

Most of the included countries have specific PA guidelines for early years, children and young people, adults, and older adults, in accordance with the target groups in the WHO PA recommendations (World Health Organization, 2010a; World Health Organization, 2019a). We found that national guidelines for other, specific target groups were much less represented. The guiding principle for the implementation of the *Global Action Plan on Physical Activity 2018–2030* is proportional universality, which states that greatest efforts should be directed towards target populations that are the least active (World Health Organization, 2018b). Countries should consider adopting the proportional universality principle in the development and implementation of their national PA guidelines. In accordance with this principle, specific PA and SB guidelines should be developed for pregnant women, people with disabilities, and people with chronic disease, as these population groups tend to be less active and more sedentary than the rest of the population (Barker et al., 2019; de Hollander & Proper, 2018; Evenson et al., 2014). These will likely feature in the updated WHO guidelines, which might facilitate their adoption in countries (World Health Organization, 2020c). It should be acknowledged that the development of specific recommendations for people with disabilities and chronic diseases may be challenging, due to a large variety of different disabilities and diseases and the fact that the guidelines may need to be disability/disease-specific. The research base supporting the development of specific recommendations for people with disabilities and chronic diseases is also less well developed.

National targets for PA and SB

Health policy experts agree that for successful national PA and SB policies it is essential to set quantifiable, comparable national targets (Daugbjerg et al., 2009; Christiansen et al., 2014; Bull et al., 2015; World Health Organization, 2007c). However, we found that such targets for PA are still not available in nearly half of

countries, while only a few countries have such targets for SB. The WHO's "global" target of "a 15% relative reduction in the global prevalence of physical inactivity in adults and in adolescents by 2030" can only be achieved through the joint effort of all countries contributing to this common goal (2018b, p. 8). This target could be used as a basis for setting a national target for PA in a country that still does not have one, but it should be adapted to the country-specific context. Setting quantifiable targets for SB may be more challenging, because evidence on prevalence of SB and its trends is less developed.

National PA and SB surveillance/monitoring

Health surveillance and monitoring have a key role in assessing the progress towards meeting PA and SB targets (Bellew et al., 2020; Bauman, Pedišić, & Bragg, 2016). There are still a large number of countries that do not have PA surveillance, particularly in the Eastern Mediterranean region. We also found that national surveillance of SB is less common than PA surveillance. This suggests that many national governments are still not committed to systematically tracking PA and SB in the population, which means that they may not be able to assess their progress in relation to the WHO targets for 2030.

Previous studies have suggested that comprehensive PA and SB surveillance systems are needed to provide a good evidence base for public health interventions and strategies (Bellew et al., 2020; Bauman et al., 2016). Our study provided data only on availability of national PA and SB surveillance. Future studies should explore the comprehensiveness of PA and SB surveillance systems, and how they conform to the principles of optimal PA and SB surveillance (Bauman et al., 2016).

7.4.2. Ministries/departments involved in the promotion of more PA and less SB

An approach that integrates policies across settings and sectors is crucial for successful PA promotion at the national level (Klepac Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2019b; Bellew et al., 2011; Daugbjerg et al., 2009; Bellew et al., 2008; World Health Organization, 2007d). We found that in most countries ministries/departments in several sectors are, at least notionally, involved in the

promotion of more PA and less SB, which suggests that, in this regard, national approaches to PA and SB policy are heading in the right direction. A PA policy audit conducted in several European countries suggested that the sport, health, and education sectors were key drivers of PA policy, and that more opportunities for PA promotion should be created in other sectors (Bull et al., 2014b). In addition to the ministries/departments of sport, health, and education, in most of the included countries we also found that ministries/departments of recreation and leisure, research, transport, and urban/rural planning and design are engaged in the promotion of more PA and less SB. Despite these encouraging findings, facilitating engagement of ministries/departments across different sectors in PA promotion remains an important task for national governments. There is still ample space for improvement, particularly in the tourism, culture, environment, work and employment, and public finance sectors. Ideally, whole-of-system (World Health Organization, 2018b) and structural approaches (Yang, Mamudu & John, 2018) would be applied, to engage all relevant sectors and utilise knowledge from public health and social sciences. As outlined in the *Global Action Plan on Physical Activity 2018–2030*, a whole-of-system approach may be necessary to enable adequate policy investments in PA (World Health Organization, 2018b).

7.4.3. Comprehensiveness of PA and SB policies

Comprehensiveness is often regarded as a key determinant of successful policies on PA (Bull et al., 2004a; Bellew et al., 2008; World Health Organization, 2003, 2007d). Our findings suggest that in most of the included countries PA and SB policies are still not sufficiently comprehensive.

In 2013, a review of PA-related policies advocated for an urgent response to the noncommunicable disease burden in low- and middle-income countries by developing comprehensive policies to increase PA (Lachat et al., 2013). The results of our study show that the level of comprehensiveness of PA policies is higher in countries with higher income level. In our sample, the level of comprehensiveness of PA policies was the lowest in the African and Eastern Mediterranean regions. It may be challenging to develop all necessary components of PA and SB policy within the available budget, particularly in low- and lower-middle-income countries, where government's spending on the prevention of non-communicable diseases is generally low, and where the

prevention of infectious diseases is a competing priority (World Health Organization, 2019b; Essue & Kapiriri, 2018). Limited funding should therefore be carefully distributed, to cover all the essential components of PA and SB policy. Low- and lower-middle-income countries and countries in the African and Eastern Mediterranean regions might benefit from greater support by international experts and organisations in the process of developing and refining their national PA and SB policies. Another option for some countries would be to consider implementing the WHO *Global Action Plan on Physical Activity 2018–2030* (2018b) and adapting their current PA policies accordingly. Governments, non-governmental organisations, academia, and other stakeholders involved in PA promotion are invited to align their efforts towards achieving the targets outlined in the plan (World health Organization, 2018b).

7.4.4. Implementation of PA and SB policies

A recent study found that most countries implemented less than a half of the noncommunicable disease policies recommended by the WHO (Allen, Nicholson, Yeung, & Goiana-da-Silva, 2020). The study also found that the number of countries that adopted PA policies is relatively large, but that it dropped between 2015 and 2017. We found that in most of the included countries half or more of the statements from key national PA and SB policies have not been implemented. Policies can be effective only if they are implemented; hence national governments should invest in mechanisms that would ensure better implementation of their PA and SB policies.

Several previous studies from high-income countries reported a lack of: (i) PA policy implementation; (ii) monitoring/evaluation of policy implementation; and (iii) allocated resources for PA policy implementation (Daugbjerg et al., 2009; Bellew et al., 2008; Tremblay et al., 2016; Schranz et al., 2016a). From our data, it seems that the situation in low- and lower-middle-income countries is even more challenging, probably because they have fewer available resources for implementation of PA and SB policies. Highly complex policy designs without clear, specific, feasible, timely, and budgeted, and trackable action/implementation plans may be a recipe for failure of policy implementation (Cairney, 2012; Ansell, Sørensen, & Torfing, 2017). Therefore, national governments should rely on evidence from implementation science and aim to establish more efficient systems for implementation of PA and SB policies. National

governments should also invest in rigorous evaluation of different types of interventions, sharing lessons learnt, and scaling-up the successful ones (Reis et al., 2016). For some national governments, especially in low and lower-middle-income countries, PA promotion may not be a priority at the national level, so developing and piloting smaller-scale interventions at the local level could be a way to start building context-specific evidence.

7.4.5. Effectiveness of PA and SB policies

Effective PA and SB policies are necessary to increase PA and reduce SB in the population. Previous studies reported a lack of evidence on the effectiveness of PA policy (Tremblay et al., 2016; Burghard et al., 2016a). Our findings indicate that the effectiveness of national PA and SB policies in most of the included countries is low to moderate. Timely modification of PA and SB policies is of utmost importance, if they prove to be ineffective. Although this may be a challenging task, countries should invest in establishing efficient and sustainable systems to evaluate national PA and SB policies, and use the gathered data to continuously improve the effectiveness of the policies.

7.5. Strengths and limitations

Strengths of this study include: (i) a large sample of countries from all world regions; (ii) separate analyses of PA and SB policies; and (iii) analyses of availability, comprehensiveness, implementation, and effectiveness of the policies.

This study was also subject to some limitations. First, not all the elements of a comprehensive analysis of PA and SB policy could be asked about, because we did not want to overburden our Country Contacts. For the same reason, we could not collect detailed data on all of the analysed policy elements. Second, the way policies are designed and implemented may vary depending on the political system, culture, and institutional settings in a given country (Hill & Hupe, 2005). Despite detailed explanations that we provided in our survey, it might be that some questions were not equally applicable to all country contexts. Third, the data were provided by GoPA! Country Contacts. It may be that some of them did not have access to all relevant data on PA and SB policies in their countries. Fourth, not all invited Country Contacts

responded to the survey, which may have led to selection bias and reduced generalisability of the results. Finally, in the African and South-East Asian regions we had relatively small sample sizes, compared with other regions. This was mainly due to a lack of internationally visible PA and public health experts in some countries who we could recruit as Country Contacts.

7.6. Conclusion

This study found that most of the included countries have formal written PA policies, guidelines for PA, quantifiable national targets for PA, and a health surveillance or monitoring system that includes measures of PA. However, the levels of comprehensiveness, implementation and effectiveness of these policies are generally low-to-moderate. Compared with PA policies, national SB policies are less available, comprehensive, implemented, and effective. Both PA and SB policies are more developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of the European and Western-Pacific regions, compared with other world regions.

Future studies should aim to include more countries from the African and Eastern Mediterranean regions, and analyse elements of a comprehensive analysis of PA and SB policy (Klepac Pogrmilovic et al., 2019a) that were not covered in this study, such as country-specific policy contexts, political will, unwritten formal statements, and informal policies. The area would also benefit from a detailed analysis of all stages of the policy cycle and policies in specific sectors.

To conclude, the findings of this study indicate that more investment is needed in the development and implementation of comprehensive and effective PA and SB policies, particularly in low- and lower-middle-income countries.

8. Discussion

This chapter has three main parts. The first part is dedicated to key findings and discussion points across all four studies of this thesis, their implications and suggestions for future PA/SB policy research. The key findings from each study and how they informed the next study are presented in Table 8. The second part is dedicated to implications and suggestions for decision-makers. Finally, the strengths and limitations of each study and the overall thesis are presented.

8.1. Implications and suggestions for future research

8.1.1. Bridging the gap between "two communities" - enhancing PA/SB policy research and PA/SB policies

The *Global systematic scoping review* (Study 1) found that "PA policy research is much more developed than it was considered" (Klepac Pogrmilovic et al., 2018). Especially in the last decade, it seems to have been experiencing significant growth (Ramirez Varela et al., 2018a). Nevertheless, in some countries, especially those of low and middle-income, no PA policy-related research was found (Klepac Pogrmilovic et al., 2018). Furthermore, the majority of available PA policy research did not employ any theoretical or conceptual framework and a number of studies that analysed PA policies failed to define their object of analysis – PA policy – which may have caused methodological errors and led to lower research quality (Klepac Pogrmilovic et al., 2018). Also, a number of studies failed to describe their research methods (Klepac Pogrmilovic et al., 2018).

SB policy research has also experienced progress in the last couple of years, but it is still underdeveloped compared to PA policy research (Klepac Pogrmilovic et al., 2018). Only 22% of studies included in the *Global systematic scoping review* mentioned SB policy and only one study (Coenen et al., 2017) analysed SB policy independently of PA policy (Klepac Pogrmilovic et al., 2018). In some countries, no research on PA and SB policies was found, which was especially the case for low-and middle-income countries (Klepac Pogrmilovic et al., 2018).

Three key findings from Study 1 informed the development of Study 4: (i) more research on SB policy is needed; (ii) more research on national PA and SB policies is needed in low- and middle-income countries; and (iii) there is a need for standardisation in PA and SB policy research, as previous studies have used various methods to analyse PA and SB policies, which poses challenges to the comparability of findings (Klepac Pogrmilovic et al., 2018). The analysis of availability, comprehensiveness, implementation, and effectiveness of national PA and SB policies in 76 countries (Study 4) found that SB policies are available in fewer countries than PA policies (Klepac Pogrmilovic et al., 2020). While 92% of countries reported having PA policies, SB policies were reported in 62% of countries (Klepac Pogrmilovic et al., 2020). National PA guidelines are reported in 62% of countries and only 40% of countries reported having national SB guidelines (Klepac Pogrmilovic et al., 2020). National health surveillance or monitoring system that includes measures of population PA is available in 71% of countries and a system that includes measures of SB is available in 51% of countries (Klepac Pogrmilovic et al., 2020). Furthermore, SB policies were also found to be less implemented, comprehensive, and effective than PA policies. Even though PA policies are more available and developed than SB polices their implementation, comprehensiveness, and effectiveness is low to moderate, especially in low-and lower-middle-income countries (Klepac Pogrmilovic et al., 2020). Findings from Study 1 and Study 4 indicate that more effort is needed from two communities – academic and policy-making – to tackle population physical inactivity and SB levels.

Determining the association between research productivity related to PA and the availability of PA and SB policy was beyond the scope of this thesis. Nevertheless, the lack of PA and especially SB policy research in some countries may be reflected in a lack of commitment towards the development of comprehensive and effective PA and SB policies and their successful implementation. An earlier study analysed associations between PA and health research and PA policy in a sample of 139 countries (Ramirez Varela et al., 2017). The study found a positive and significant correlation between the country's research productivity related to PA and the availability of PA policy (Ramirez Varela et al., 2017). In the countries where no PA and health-related research was found, the proportion of countries with no PA policy or plan available was the highest (Ramirez Varela et al., 2017).

Study 4 also found that 68% of countries had ministries or departments of *research* with an active role in the promotion of more PA and/or less SB. However, explicit research evidence seems to be rarely used in PA policy-making (Aro et al., 2016; Hämäläinen et al., 2015). The *Systematic review of instruments* (Study 3) found that only a few developed instruments for PA/SB policy analysis include items pertaining specifically to the *research* sector and only a few instruments encompassed items about whether a policy is research/evidence based (Klepac Pogrmilovic et al., 2019b). Better policies in the research sector may help improve the evidence base for PA and SB policies, which makes this sector highly relevant from a policy analysis perspective. As recognized in the CAPPA framework (Study 2), PA policies in the *research* sector can have an important indirect effect on PA levels in the population, for example, Canada's *Physical Activity and Sport Act* mentions that the Minister will take appropriate measures to support research or studies related to PA and sport (Klepac Pogrmilovic et al., 2019a; Government of Canada/Gouvernement du Canada, 2003).

In the literature on research to policy translation, policymakers and researches are often portrayed as two very contrasting communities who speak different languages and have different values (Smith, 2013; Brownson, 2006). Even though the "two communities" face different incentives, rewards, time frames, and pressures, they are not entirely isolated from each other (Newman, Cherney, & Head, 2016). Regardless of the differences between the communities, which may in some countries be greater than in others, these communities should focus on a common goal – promoting PA and tackling population physical inactivity and SB levels. The "academic community" – PA and SB policy researchers – should consider making PA and SB research more accessible to policy makers and focus more closely on policy needs and policy-relevant research (Smith, 2013). They should also acknowledge the importance of the research sector in the PA promotion, as has been recommended in the CAPPA framework (Klepac Pogrmilovic et al., 2019a). Future research efforts of the academic community engaged in PA and SB policy research could be directed towards helping policy makers in improving the comprehensiveness, effectiveness, and implementation of PA and SB policies. Also, in order to enhance the quality and impact of the PA and SB policy research field, future PA and SB policy studies should: (i) consider utilising existing theoretical and conceptual frameworks; (ii) aim to clearly conceptualise PA and SB policy and provide the definitions of PA and SB policy they relied on; and (iii) clearly

specify their research methods (Klepac Pogrmilovic et al., 2018). Even though evidence-based policies are seen as desirable by policy makers, researchers, stakeholders, and the broader population, assessments of public health policies found that they are not evidence-based (Hämäläinen et al., 2015; Smith, 2013). The "policy-making community" should actively engage in the creation of research- and evidence-based PA and SB policies and further support the active role and engagement of ministries/departments of *research* in the promotion of more PA and/or less SB. Therefore, policy makers should aim to put greater efforts in bridging the policy-academia gap and focus on the development and implementation of comprehensive and effective PA and SB policies that are evidence-based. Detailed suggestions for decision makers are provided in the next part of this chapter.

Table 8. Summary of included publications/studies

Study	Chapter	Aim	Research gap(s)	Methods	Key findings/results	Information about publication
I	4	- Mapping the evidence on indicators, development, and content of national PA and/or SB policies globally	- No systematic or scoping review of studies related to analysis of national PA and SB policies was found	- Systematic scoping review of literature	Key findings from Study 1 are: (i) PA policy research is much more developed and refined than it was considered several years ago. (ii) SB policy research is still in its infancy. (iii) There is a lack of PA and SB policy research in low- and middle- income countries. (iv) The definition of policy varied significantly across studies, most studies did not rely on any framework (The definitions are available in Appendix B5: Additional file 5). (v) Studies have used different methods to analyse policy, which may cause problems with comparability (The methods used in all reviewed studies are available in Appendix B2: Additional file 2).	- Klepac Pogrmilovic, B. et al. (2018) *A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies*. IJBNPA. 15(123). available at: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-018-0742-9
II	5	- Development of a new conceptual framework for PA policy analysis	- Through Study 1 it was found that the only framework for PA policy research was developed in 2006 and that PA policy research is now more refined - finding (i), and that the definition of policy varied significantly across studies, and most studies did not rely on any framework – finding (iv). These findings informed the development of the CAPPA framework.	- Review of literature - Open discussion - Delphi process (3 rounds) - Consultation process (2 rounds)	Key findings from Study 2 include the development of the CAPPA framework with contains six building blocks and their respective 38 elements namely: (i) *purpose of analysis* (including: auditing and assessment of policies); (ii) *policy level* (including: international; national; subnational; local; and institutional policies); (iii) *policy sector* (including: health; sport; recreation and leisure; education; transport; environment; urban/rural planning and design; tourism; work and employment; public finance; and research sectors); (iv) *type of policy* (including: formal written policies; unwritten formal statements; written standards and guidelines; formal procedures; and informal policies); (v) stage of policy cycle (including: agenda setting; formulation; endorsement/legitimisation; implementation; evaluation; maintenance; termination; and succession); and (vi) *scope of analysis* (including: availability;	- Klepac Pogrmilovic, B. et al. (2019) *The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework.* IJBNPA. 16(60). available at: https://link.springer.com/content/pdf/10.1186/s12966-019-0822-5.pdf

					context; processes; actors; political will; content; and effects).	
III	6	- Identify and critically assess instruments for the analysis of national-level PA/SB policies	- No previous review that assessed available instruments for PA/SB policy analysis was found.	- Systematic review of literature - Data extraction based on the CAPPA framework	Key findings from Study 3 are: (i) Only two instruments include questions about SB policy. (ii) No instruments allow for the analysis of all important elements of national PA/SB policy. (iii) Some important elements such as the *tourism* and *research* sectors, the *agenda setting* and *endorsement/legitimisation* stages, and the *effects* of policy are addressed by only a few instruments. (iv) No matching item (related to one element) for both auditing and assessment are available in a single instrument.	- Klepac Pogrmilovic, B. et al. (2019) *A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies*. Health Research Policy and Systems.17(86) available at: https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-019-0492-4
IV	7	- Audit and assess availability, comprehensiveness, implementation, and effectiveness of PA and SB policies globally	- Through Study 1 it was found that: SB policy research is still in its infancy – finding (ii); there is a lack of PA and SB policy research in low- and middle-income countries – finding (iii); studies have used different methods to analyse policy, which may cause problems with comparability – finding (v), - Through Study 3 it was found that: only two instruments include questions about SB policy – finding (i); no instrument allows for the analysis of all important elements of national PA	- Development of the PA/SB policy analysis tool - *GoPA! Policy Inventory 2019* version 3.0. based on two instruments and the the CAPPA framework - Data obtained for 76 countries - Data analysis in SPSS for the whole sample and stratification by economic standard and world regions - Statistics: frequencies, medians and their 95% confidence intervals and interquartile ranges - Ordinal variables: Kruskal-Wallace test - Categorical variables: Chi square test, - $p < 0.05$ used as a threshold for	Key findings from Study 4 are: (i) Most countries have PA policies, but their comprehensiveness, implementation, and effectiveness are generally low-to-moderate. (ii) SB policies are less available, comprehensive, implemented, and effective than PA policies. (iii) PA and SB policies are better developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of European and Western-Pacific regions, compared with other world regions.	- Klepac Pogrmilovic, B. et al. (2020) *National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness.* IJBNPA.17(116) available at: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-01022-6

	and SB policy – finding; (iii); no matching items for both auditing and assessment in a single instrument – finding (iv), which – These findings informed the development of Study 4.	statistical significance

CAPPA: Comprehensive Analysis of Policy on Physical Activity, PA: Physical Activity, SB: Sedentary Behaviour

8.1.2. Improving the comprehensiveness of PA and SB policy analysis by following the CAPPA framework

Three key findings from Study 1 informed the development of Study 2: (i) PA policy research is considerably more developed than it was considered a couple of years ago; (ii) most studies did not employ any theoretical or conceptual framework; and (iii) the definitions of PA policy varied across studies (Klepac Pogrmilovic et al., 2018). The only framework for PA policy research was developed in 2006 when PA policy research was still in its infancy. Knowledge and understanding of the key elements and categories necessary for a comprehensive PA/SB policy analysis are now more refined. Therefore, in Study 2, a new conceptual framework for analysis of PA policies – the CAPPA framework – was developed (Klepac Pogrmilovic et al., 2019a). The CAPPA framework is based on the most recent advances in PA policy research and it utilises knowledge from older and broader disciplines such as public health and political science. The framework may be used as a guide for future PA and SB policy studies. It may improve classification systems and methodological and conceptual foundations of both PA and SB policy research (Klepac Pogrmilovic et al., 2019a).

The CAPPA framework specifies seven elements within the *scope of analysis* building block: *availability*, *context*, *processes*, *actors*, *political will*, *content*, and *effects* (Klepac Pogrmilovic et al., 2019a). Within the *types of policy* building block, five types of PA policies are specified: *formal written policies*, *formal procedures*, *written standards and guidelines*, *unwritten formal statements*, and *informal policies* (Klepac Pogrmilovic et al., 2019a). The availability of national PA policies, that is *formal written policies* and *formal procedures*, has been previously analysed by the GoPA! (Ramirez Varela et al., 2018b; Ramirez Varela et al., 2017; Ramirez Varela et al., 2016) and the WHO (World Health Organization, 2014b, 2007a, 2012, 2016, 2018c). Study 4 was the first to analyse the availability of SB policies separately to PA policies, which included the audit and/or assessment of *formal written policies*, *written guidelines*, and *formal procedures* (Klepac Pogrmilovic et al., 2020). A few international studies analysed *content* of *formal written policies* and *written guidelines* (Kahlmeier et al., 2015; Daugbjerg et al., 2009; Christiansen et al., 2014). It was beyond the scope of this thesis to thoroughly explore which *types of policies* have mostly been analysed in PA and SB policy studies. Nevertheless, studies with available definitions of PA policies mainly defined PA policies in a way which falls within the scope of the definitions of

formal written policies, formal procedures, and *written standards and guidelines* (Klepac Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2018). This may be an indicator that *unwritten formal statements* and *informal policies* are understudied. Another indicator is a finding from Study 3 that no instrument for PA/SB policy analysis contains items to analyse *unwritten formal statements* and *informal policies* (Klepac Pogrmilovic et al., 2019b).

It is understandable that more research focus is placed on the analysis of *formal written policies, formal procedures,* and *written standards and guidelines* because the analysis of these types of PA and SB policies is more straightforward than the analysis of *unwritten formal statements* and *informal policies. Unwritten formal statements* and *informal policies* may be difficult to identify and analyse (Klepac Pogrmilovic et al., 2019a). However, a conclusion based exclusively on a lack/availability of *formal written policy* may be misleading. For example, a policy analyst may conclude that a specific country has an underdeveloped PA or SB policy because analysis showed that the country lacks a PA/SB strategy or another type of a *formal written policy*. Nevertheless, the country might have *unwritten formal statements* made by its decision makers, which indicate the government's solid intention to promote PA or some strong *informal policies* in place aimed at PA promotion. Similarly, a certain country might have well-developed *formal written policies* related to PA, such as a PA strategy and an action plan, but some of its *unwritten formal policies* and *informal policies* may indicate an absence of political will to increase PA levels and promote PA (Klepac Pogrmilovic et al., 2019a). Future studies should: (i) consider exploring the extent to which existing PA and SB policy studies analysed *unwritten formal statements* and *informal policies* related to PA and SB; (ii) develop additional instruments or modify existing ones to include questions about *formal unwritten policies* and *informal policies*, alongside the items about other types of PA and SB policies; and (iii) analyse *unwritten policies* and *informal policies* related to PA and SB alongside other types of PA and SB policies.

Besides *availability* and *content* of different types of PA and SB policies, *context* may be an especially important aspect future PA and SB policy studies should consider analysing. Study 3 found that very few instruments contain items that ask about broad, country-specific context, such as political, legal, social, cultural, and religious values

relevant for PA promotion or SB reduction, the nature of political systems, and the dominant ideology (Klepac Pogrmilovic et al., 2019b). An assessment of context primarily focused on narrow political and/or economic circumstances relevant to PA and SB policies may be misleading (Klepac Pogrmilovic et al., 2019b). For example, a country may have a strategy to promote active travel and its government invested a lot of financial resources to develop it. By examining only the strategy's *availability* and *content*, researchers and/or PA policy analysists could find the strategy to be inclusive, comprehensive, and well-written. They may also find that there are specific *actors* in charge for its implementation and that *political will* to implement the strategy is strong. However, due to the country's strict religious values that dominate its political system, women on bicycles are perceived as a threat to morality. Not including the broader *context* into policy analysis may lead to a conclusion that the new active travel strategy is adequate to support population engagement in active transport. However, it is important to note that examining the broader *context* of a country may be time-consuming and can, for various reasons (e.g. language, political pressure, or inadequate resources), represent a challenge for both local and non-local researchers and other PA policy analysts. Joint international collaborative projects such as the *European Network for Action on Ageing and Physical Activity* (Rütten et al., 2012) and the development of the HEPA PAT by the *European Network for the Promotion of Health-Enhancing Physical Activity* (Bull et al., 2014a) can serve as platforms to overcome potential issues and challenges.

In Study 3, no instrument for PA/SB policy analysis was found that could be used to explore power and power relationships in different processes relevant for PA/SB policy-making (Klepac Pogrmilovic et al., 2019b). As previously suggested, the analysis of power in policy-making can "improve health outcomes" (Buse et al., 2009). Power is "one of the most important concepts" in public policy, policy-making, and political science in general (Cairney, 2012, p. 47). As recognised in the CAPPA framework, power can be analysed within different elements of the *scope of analysis* category such as *processes*, *actors*, *political will*, and *context* (Klepac Pogrmilovic et al., 2019a). For example, three *actors* – a national ministry for health, an NGO for PA promotion, and a university – have been collaborating on the evaluation of a PA strategy. For a PA policy analyst/researcher it would be important to understand how the process of their collaboration works in practice. Some examples of research

questions may include: “Do actors make decisions in a democratic way?”; “Are the decisions of the NGO or the university influenced by the fact that they receive public funding?”; “Are any external pressures influencing the decision-making process”; and “Are there any internal pressures to evaluate policy positively?”. Developing new or modifying existing instruments to allow for analysis of power could potentially enhance the PA and SB policy area and contribute to valuable insights.

More than a decade ago, Schmid and colleagues (2006) recommended the development of measurement tools for better assessment of *effects* of PA policies. Study 3, found only a few instruments that contain items related to assessment of PA policy *effects* (Klepac Pogrmilovic et al., 2019a). Since Schmid et al.’s recommendation (2006), it seems like little to no progress has been made in that area. This does not come as a surprise because the effects of PA/SB polices on lower levels, especially local and organisational levels, are much more straight forward when it comes to measurement (Kohl & Cook, 2013), than the effects of national-level policies. The effectiveness of national PA/SB policies was assessed in Study 4 (Klepac Pogrmilovic, 2020). The study found that effectiveness of national PA and SB policies is low to moderate in most countries. The effectiveness of national PA and SB policies was especially low in low and lower-middle income countries (Klepac Pogrmilovic, 2020). Future PA and SB policy research should focus on the development of efficient systems, instruments, theories, and frameworks that will support the assessment of the effectiveness of national-level PA and SB policies. This could potentially help decision-makers to use the gathered evidence, insights, and data and improve the effectiveness of PA and SB policies.

The CAPPA framework specified two elements under the building block *purpose of analysis: auditing* and *assessment* (Klepac Pogrmilovic et al., 2019a). Study 3 found that a large majority of instruments contain items for *auditing* of PA policies (Klepac Pogrmilovic et al., 2019a). According to the CAPPA framework, *auditing* implies that an item asks about a certain aspect of policy but does not attempt to rate, grade, evaluate, or judge it (Klepac Pogrmilovic et al., 2019a). On the other hand, instruments and/or items for policy *assessment* purposes are intended to rate, grade, evaluate, or judge a policy or specific aspects of a policy (Klepac Pogrmilovic et al., 2019a). As stated in the CAPPA framework, conducting a policy *audit* may be considered a

precondition for conducting a policy *assessment*, because it is essential to "find out which aspects of policy exist before they can be assessed" (Klepac Pogrmilovic et al., 2019a).

Study 3 found two instruments (Daugbjerg et al., 2009; Christiansen et al., 2014) that contained items only for policy auditing purposes (Klepac Pogrmilovic et al., 2019b). Both instruments were auditing only *formal written policies* and focused on their *content* and *actors* involved (Klepac Pogrmilovic et al., 2019a). This type of concentrated *audit* of *formal written policies* has multiple benefits, such as likely easier and faster data collection and analysis. However, it is important to note that even though policy *auditing* may be more objective, straightforward, and considered as an easier approach to data collection, *auditing* without an *assessment* may be misleading and/or inadequate to draw conclusions about a country's PA policy. For example, in a given country, a PA policy *audit* could find that various actors from different sectors are in charge of the implementation of a PA policy strategy. This can be an indicator of successful multi-sector collaboration. Nevertheless, in practice, having multiple actors in charge of implementation may make the process more complicated, as roles and responsibilities may be unclear, and processes for collaboration may slow down the progress. Therefore, it is recommended to *assess* factors, such as the actors' roles, their collaboration, and their ability to implement policy (e.g. human, financial and organisational resources), to draw sound conclusions about the adequacy or quality of the country's policy implementation.

On the other hand, Study 3 found two instruments (Tremblay et al., 2014; Yancey et al., 2010) that contain only items for PA policy *assessment* (Klepac Pogrmilovic et al., 2019b). Several researchers that were asked to provide responses to the questions used in the *AHK Global Alliance* survey (Tremblay et al., 2014) reported a lack of evidence, indicators, and systems which would support the *assessment* of PA policy in their countries (Tremblay et al., 2016; Aguilar-Farias et al., 2016; Akinroye et al., 2014; González et al., 2016; Katikireddi et al., 2011). Therefore, future PA and SB policy research should aim to develop new or modify existing instruments to contain matching items for *audit* and *assessment* and to clearly establish and define benchmarks for PA and SB policy *audit* and *assessment*. Future studies that would employ such

instruments could serve as useful reference for the development and implementation of PA and SB policies and their improvement.

As stated above, Study 1 found that studies on PA and SB policies are especially rare in low- and middle-income countries (Klepac Pogrmilovic et al., 2018). Study 4 found that the availability of PA/SB policies as well as their level of implementation, comprehensiveness, and effectiveness is generally lower in low and lower-middle income countries (Klepac Pogrmilovic et al., 2020). Furthermore, PA and SB policies were found to be less developed in the African and Eastern-Mediterranean regions compared to other regions (Klepac Pogrmilovic et al., 2020). Therefore, future studies should especially focus on *audit* and *assessment* of PA and SB policies in low and middle-income countries as well as in the African region and the Eastern-Mediterranean region.

To conclude, future research should: (i) explore the extent to which PA/SB policy analyses have examined each of the elements listed in the CAPPA framework; (ii) develop new instruments for PA and SB policy analysis or adapt existing ones to allow for a more comprehensive PA and SB policy analysis; (iii) analyse all elements of PA and SB policies, especially the ones that are understudied, such as *unwritten formal statements* and *informal policies*; and (iv) put an emphasis on conducting PA and SB policy analysis in low- and middle-income countries and regions with less available PA and SB policy-relevant research and PA and SB policies (Klepac Pogrmilovic et al., 2018a; Klepac Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2019b; Klepac Pogrmilovic, 2020).

8.2. Policy implications and suggestions for decision makers

The *Global Action Plan on Physical Activity 2018–2030: More active people for a healthier world* emphasized the necessity for national implementation of a system-based approach which requires cross-government leadership combined with multi-sectoral partnerships and community engagement (World Health Organization, 2018b). This approach is in line with the CAPPA framework (Klepac Pogrmilovic et al., 2019a) and requires a coordinated response from the whole system, which can bring multiple

health, economic, and environmental benefits for the whole population (World Health Organization, 2018b).

In line with the findings of the literature review and studies 1, 2, 3, and 4, some of the key suggestions for decision makers include:

(i) Consider developing comprehensive PA and SB policies by adopting systems thinking, multi-sectoral, cross-sectoral, and a whole system approach (Klepac Pogrmilovic et al., 2019a; Nau, Lee, Smith, Bellew, Reece et al., 2019; Bellew, Nau, Smith, & Bauman, 2020).

(ii) Incorporate implementation strategies into PA and SB policies and start considering them already from the early stages of the policy development process and design (Klepac Pogrmilovic et al., 2019a; Ansell et al., 2017).

(iii) Enhance PA and SB policy implementation by relying on evidence from implementation science and establishing efficient systems for monitoring the progress of implementation with a dedicated and trained workforce for PA and SB policy implementation (Daugbjerg et al., 2009; Sallis et al., 2016; Klepac Pogrmilovic et al., 2020).

(iv) Invest in sustainable and efficient systems for evaluation of PA and SB policies and use the gathered information to continuously improve the effectiveness of PA and SB policies (Klepac Pogrmilovic et al., 2019b; Klepac Pogrmilovic et al., 2020).

(v) Invest in regular *audit* and *assessment* of PA and SB policies. Following the CAPPA framework, ideally, PA and SB policies should be regularly audited and assessed at all stages of the policy cycle: *agenda setting*, *formulation*, *endorsement/legitimisation*, *implementation*, *evaluation*, *maintenance*, *termination*, and *succession* (Klepac Pogrmilovic et al., 2019a). However, if that is not feasible due to various constraints, such as funding and time, focusing on the *formulation*, *implementation*, and *evaluation* stages may be adequate.

(vi) Promote cross- and multi-sectoral approaches across multiple settings by including relevant sectors in the development and implementation of PA and SB policies, namely the *health*, *sport*, *recreation and leisure*, *education*, *transport*, *environment*, *urban/rural planning and design*, *tourism*, *work and employment*, *public finance*, and *research* sectors (Klepac Pogrmilovic et al., 2019a).

(vii) Engage ministries/departments that are not actively involved in the promotion of more PA/less SB. As found in Study 4, in most countries, these are the

ministries/departments of *tourism*, *culture*, *environment*, and *public finance*. (Klepac Pogrmilovic et al., 2020). It may be of particular importance to establish a more active role in PA promotion of ministries/departments with jurisdiction over the natural environment, as PA performed in natural environments has been associated with additional psychological benefits when compared with PA performed in other types of environments (Calogiuri & Elliott, 2017). Furthermore, as presented in Study 4, forty per cent of countries did not report having ministries/departments of *transport* and *urban/rural design* actively involved in the promotion of more PA/less SB (Klepac Pogrmilovic et al., 2020). Their role in PA promotion/SB reduction seems to be particularly underutilised given that the evidence shows that investments in the promotion of PA in *transport* and *urban/rural design* sectors can have multiple health, social, and economic benefits (Giles-Corti, Foster, Shilton, & Falconer, 2010; Badland & Schofield, 2005).

(viii) Invest in research on international, national, subnational, and local PA and SB policies (Klepac Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2020), which may serve to inform future PA and SB policy development and implementation and provide up-to-date policy analysis of the current PA and SB policies.

8.3. Strengths and limitations

Each study within this thesis contains its specific strengths and limitations. I will first list the key strengths and limitations of each study and then of the overall thesis.

There are four key strengths of Study 1. First, the *Global systematic scoping review* was conducted using an extensive literature search conducted through various relevant databases, web pages of three key international organisations for PA promotion, and the reference lists of all included publications (Klepac Pogrmilovic et al., 2018). Such a thorough screening of 24,872 documents reduced the probability of overlooking relevant publications that should have been included in the systematic scoping review (Klepac Pogrmilovic et al., 2018). Second, in the *Global systematic scoping review*, an inclusive search syntax was used along with broad eligibility criteria. This contributed to the inclusion of various policy studies related to a broad range of PA and SB topics. Third, two independent researchers assessed the eligibility of studies. This process significantly reduced the likelihood of bias in the selection of studies (Klepac

Pogrmilovic et al., 2018). Finally, the review contains the data extracted from twelve studies that have full texts in languages other than English (Klepac Pogrmilovic et al., 2018).

Study 1 has three key limitations. The first limitation of Study 1 is the inclusion criteria. Only publications with titles and abstracts in English were eligible to be included in the *Global systematic scoping review* (Klepac Pogrmilovic et al., 2018). Due to the strict time-frame and budgetary restrictions of a PhD thesis, it was not feasible to include publications that did not have at least title and abstract in English. However, twelve publications that had title and abstract in English but full text in a language other than English were included. The *Global systematic scoping review* included publications in the following languages: Chinese, Czech, French, Korean, Portuguese, and Spanish. The second limitation is related to quality assessment. A quality assessment of studies was not performed due to the fact that studies used a wide range of methods and study designs. Therefore, only a general assessment was provided based on the data extracted from each study (Klepac Pogrmilovic et al., 2018). Finally, a thorough analysis of PA and SB policies for each country (i.e. an analysis of the policies that studies included in the review analysed) was not conducted. Such a comprehensive assessment would exceed the scope of the systematic scoping review. However, the summarised findings for 168 countries included in the review are provided in Appendix B3: Additional file 3 (Klepac Pogrmilovic et al., 2018). Also, a thorough analysis of PA/SB policies for 76 countries around the world is provided in Study 4 of this thesis (Klepac Pogrmilovic et al., 2020).

The key strengths of Study 2 are: (i) a rigorous method applied for the development of the CAPPA framework; and (ii) the CAPPA framework provides a comprehensive and detailed categorisation of a complex and multifaceted area into measurable components (Klepac Pogrmilovic et al., 2019a). The developed CAPPA framework is comprehensive, yet also visually simple, it can be applied to different political contexts, and it contains supporting definitions and real-world examples for each category and element it encompasses (Klepac Pogrmilovic et al., 2019a).

Three key limitations of the CAPPA framework are related to the complex and diverse nature of different political systems around the world and the wealth of literature and

knowledge in the fields of health policy, PA policy research, and political science. Even though the CAPPA framework and its categories and elements are developed to be as comprehensive and generalisable as possible, it may happen that: (i) some elements and categories will not be applicable to all countries; (ii) some elements will overlap with each other in different political contexts; and (iii) some additional elements and/or categories exist that are not covered by the framework (Klepac Pogrmilovic et al., 2019a).

Study 3 has four main strengths. The first strength is related to an extensive literature search performed through various bibliographic databases, websites, and search engines. Furthermore, the reference lists of all included publications were also screened. The thorough and extensive literature search reduced the likelihood of excluding relevant studies. The second strength is related to an inclusive search syntax, as well as broad eligibility criteria, that were employed in order to find various instruments for PA/SB policy analysis. The third strength is related to the assessment of studies eligible for inclusion and the data extraction which were conducted by two people. This reduced the likelihood of subjectivity, bias, and human error (Klepac Pogrmilovic et al., 2019b). Finally, data extraction was performed based on a comprehensive conceptual framework – the CAPPA framework (Klepac Pogrmilovic et al., 2019a).

The key limitation of Study 3 is related to language restrictions. Due to the strict budget and time-frame of a PhD thesis, it was not feasible to include publications with non-English abstracts and/or full texts. This may have caused the exclusion of some studies describing instruments for PA and/or SB policy analysis. Another limitation is related to a formal quality assessment, which could not have been performed (Klepac Pogrmilovic et al., 2019b). The included studies contain various methods and have different aims, which limited the ability to conduct a formal quality assessment of the studies and instruments for PA/SB policy analysis included in the review (Klepac Pogrmilovic et al., 2019b). However, a general assessment of the instruments was provided as well as their general strengths and limitations and recommendations for their further use (Klepac Pogrmilovic et al., 2019b).

Major strengths of Study 4 include: (i) an analysis of the most recent and comparable data from 76 countries from all world regions; (ii) analyses of the following components of PA and SB policies: availability, comprehensiveness, implementation, and effectiveness; and (iii) separate analyses of national policies related to PA and SB (Klepac Pogrmilovic et al., 2020).

Study 4 is also subject to some limitations. The *GoPA! Policy Inventory version 3.0* was developed to be as applicable as possible to different countries and their specific contexts. The development of the *GoPA Policy Inventory! version 3.0* was informed by the experiences of users of the previous tools for audit of PA policies that are more complex and comprehensive (Klepac Pogrmilovic et al., 2019a; Bull et al., 2015). Therefore, the *GoPA Policy Inventory! version 3.0* was developed to be a simple and practical tool that gathers the most important information on PA and SB policies. This was mainly because the GoPA! Country Contacts are volunteers and a more extensive questionnaire could overburden them (Klepac Pogrmilovic et al., 2020). Due to the fact that the *GoPA Policy Inventory! version 3.0* was not developed to be a tool for a comprehensive audit and assessment of PA and SB policies, not all elements of national PA and SB could be inquired about. Furthermore, the development and implementation of PA and SB policies may significantly vary across countries due to different political, legal, and economic systems, cultural differences, and various organisational and institutional settings (Klepac Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2020). The *GoPA! Policy Inventory version 3.0* provides detailed explanations and includes several definitions, but it may be that some questions and items can not be equally applied to all countries and their specific contexts (Klepac Pogrmilovic et al., 2020). Lastly, in two regions, namely the African and South-East Asian regions, the sample size was smaller than the other regions. This was largely due to a lack of internationally visible public health and/or PA experts in some countries who could have been recruited as the GoPA! Country Contacts (Klepac Pogrmilovic et al., 2020).

The key strengths of this thesis include: (i) a comprehensive, systematic literature search was conducted to determine the current status of the national-level PA/SB policy research (Klepac Pogrmilovic et al., 2018; Klepac Pogrmilovic et al., 2019b); (ii) all four studies included in this PhD thesis were published in Q1 (i.e. top 25%) journals according to Scimago journal rankings (Klepac Pogrmilovic et al., 2018; Klepac

Pogrmilovic et al., 2019a; Klepac Pogrmilovic et al., 2019b; Klepac Pogrmilovic et al., 2020); (iii) findings of each study informed the development of the next study which strengthens the overall narrative of the thesis; (iv) the overall thesis addressed major gaps in knowledge related to PA and SB policy research; (v) within this thesis, two novel and original tools were developed to support PA/SB policy analysis – the CAPPA framework (Klepac Pogrmilovic et al., 2019a) and the *GoPA! Policy Inventory version 3.0*, which may significantly contribute to the standardisation and enhancement of the PA and SB policy research area (as they can be used by PA and SB policy researchers, decision makers, public health professionals, policy analysts, and public health stakeholders from governmental and non-governmental sectors interested in PA/SB policy analysis); and (vi) the *GoPA! Policy Inventory version 3.0* is among the first instruments containing matching items for both audit and assessment, which allows for a more straightforward interpretation and analysis PA and SB policies (Klepac Pogrmilovic et al., 2019b).

This overall PhD research project also had some limitations; these are primarily related to the defined time-frame and budget. Besides already mentioned limitations specific to each study, a general limitation of the overall thesis was the inability to analyse also subnational and local policies. Even though national PA and SB policies are a critical starting point for the development of policies on subnational and local levels, subnational and local policies are an often a very important point for population-based reduction of physical inactivity and SB. A thorough analysis of subnational and local PA and SB-related policies would enhance the knowledge-base on PA and SB policies. Another possible limitation is related to the multifaceted and complex nature of PA policies. PA and SB policies may be a part of a policy that does not focus primarily or exclusively on PA or SB. Although NCD, sport, education, transport, obesity, health, and environment policies that mention PA and SB have been considered throughout this thesis, a more focused review and analysis of these sector-specific policies may be needed to gain a complete picture of their availability and level of development.

9. Conclusion

Research on PA policies was found to be more developed and refined than it had been previously considered. SB policy research has experienced significant growth in the last couple of years but is still in its infancy and has mostly been examined with or as a part of PA policy analyses. A significant number of countries still have little to no research on PA policies and research on SB policies is especially scarce. PA and SB policy research is particularly limited in low- and middle-income countries.

Most countries have: (i) formal written national-level PA policies; (ii) PA guidelines; (iii) quantifiable national targets for PA; and (iv) national health surveillance/monitoring systems that include measures of PA. However, the levels of their implementation, comprehensiveness, and effectiveness are largely low-to-moderate. National SB policies are less available, implemented, comprehensive, and effective, when compared to PA policies. Significant differences between the availability of PA and SB policies were found between high-income and low- and lower-middle-income countries and between world regions. In general, national PA and SB policies are more developed in high-income countries, compared with low- and lower-middle-income countries. Furthermore, countries of the European region and Western-Pacific region have better developed PA and SB policies, compared with other world regions.

More investments and efforts are required to facilitate: (i) PA and SB policy research, especially in low-middle income countries; and (ii) the development and implementation of comprehensive and effective PA and SB policies, especially in low- and lower-middle-income countries. International projects including countries from different world regions and with different income levels, which include governmental and non-governmental organisations for PA promotion as well as the academic sector and community partners, may be a good way forward towards creating systems to support promotion of more PA and less SB, and contribute to better health of populations. Only persistent, collaborative efforts from various stakeholders between and within countries will contribute to creating a more active, healthier world and to facilitating sustainable change at the global level.

Appendices

Appendix A: Full versions of published manuscripts

Appendix A1: A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies

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REVIEW

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A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies

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Abstract

Background: National policy approaches to physical activity (PA) promotion and sedentary behaviour (SB) reduction are needed to address rising rates of non-communicable diseases. Understanding the policy process and impact through robust research and evaluation is crucial for facilitating successful reforms in national health policy. This scoping review, therefore, aimed to map the evidence on indicators, development, and content of national PA and/or SB policies globally.

Methods: A systematic search of academic and grey literature was conducted through six bibliographic databases, Google, and websites of three large organisations for PA promotion.

Results: Out of 24,872 screened documents, 203 publications from 163 studies were selected. The selected studies investigated PA/SB policies in 168 countries worldwide, and we provided summary results for each of the countries. Overall, 69, 29, and 2% of the analyses of national PA/SB policies were conducted for high-, middle-, and low-income countries, respectively. Twenty-two percent of the studies mentioned SB policies as part of their analysis, with only one study focusing solely on assessing SB policies. Operational definitions of policy were found in only 13% of publications. Only 15% of the studies used a conceptual or theoretical framework. A large variety of methods were used for data collection and analysis of PA/SB policy.

Conclusions: We found that PA policy research is much more developed than it was considered several years ago. Research around SB policies is still in its infancy, but it seems to have experienced some positive progress in the last few years. Three key issues were identified that should be addressed in further research: [i] there is a lack of PA/SB policy research in low- and middle-income countries, which is an important limitation of the current body of evidence; [ii] the definition of policy varied significantly across studies, and most studies did not rely on any theoretical framework, which may impede cross-study comparisons; and [iii] studies have used a variety of methods to analyse policy, which may also cause problems with comparability. Future PA/SB policy research should aim towards a clearer conceptualisation of policy, greater reliance on existing theoretical frameworks, and the use and further development of standardised methods for PA/SB policy analysis.

Keywords: Physical activity, National policy, Sedentary behaviour, Sitting, Physical inactivity, National plan, Strategy

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Background

More than 40 million people a year die from noncommunicable diseases (NCDs), of which 15 million deaths are considered premature [1]. This accounts for around 70% of overall global mortality [2], with high rates in low-, middle-, and high-income countries [1]. Insufficient physical activity (PA) and sedentary behaviour (SB) are among the key risk factors for NCDs. Global estimates indicate that the latter was responsible for 3.8% of deaths from 2002 to 2011 [3] and the former for 9% of deaths in 2008 [4]. In 2013, the estimated cost of insufficient PA to worldwide health-care systems was around 53.8 billion international dollars [5]. Insufficient PA and prolonged sitting are, therefore, not just significant health risk factors for global mortality but also a vast economic burden for national health care systems. National policy approaches to PA promotion and SB reduction are an essential aspect needed to address rising rates of NCDs [6].

The policy environment is perceived as one of the important determinants influencing active living at the population level [7]. The main goals of public policy related to PA are to allow for creating supportive programs, infrastructure, and environments for people to engage in physically active lifestyles [8, 9]. Research related to PA has informed the development of policy in the health sector and non-health sectors such as education, transport, sport, and environment [10–12]. PA policy research has been developing since 1990s. This field of research lagged behind the research on health outcomes of PA by more than 30 years [13, 14]. Therefore, PA policy research is still widely considered to be an area in need of more research, particularly in terms of large-scale evaluations of implementation and impact [13, 15, 16].

Since 2000, two key global efforts have occurred in PA planning and policy [17]. In 2002, The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) in the United States of America (USA) conducted international consultations on PA policy development [18]. The consultations informed the development of the *Global Strategy on Diet, Physical Activity and Health,* which is perceived to be the first major global effort related to PA policy [19]. The strategy targeted governments, along with non-governmental agencies, as the main agents of social change that can enhance population PA levels by creating supportive environments. The second major initiative was the United Nations (UN) high-level meeting on NCDs in 2011, where physical inactivity was acknowledged as an important determinant of NCDs globally [17]. Along with these major global efforts, various international leadership and advocacy networks were established to support the promotion of PA, such as: *Red Actividad Fisica de las Americas*/Physical Activity Network of the Americas (RAFA/PANA) in 2000; Asia Pacific Physical Activity Network (AP-PAN) and the European Network for the Promotion of Health-Enhancing Physical Activity (HEPA Europe) in 2005; Global Advocacy for Physical Activity (GAPA) in 2007; Africa Physical Activity Network (AFRO-PAN) in 2010; Global Observatory for Physical Activity (GoPA!) in 2012; and Active Healthy Kids Global Alliance in 2014.

Studies on SB form a relatively new field of behavioural epidemiology. Interest in this area has started growing rapidly in the last decade, after epidemiological evidence indicated that long periods of sitting might pose a health risk, irrespective of one's PA level [20]. It should be noted, however, that recent studies have questioned the validity of evidence on SB as an independent health risk factor [21–24]. The main goals of emerging SB related public policy is to allow for creating supportive programs, infrastructure, and environments to support people to minimise their time spent in SB and to break prolonged periods of SB. Although evidence on the prevalence, trends, determinants, and health outcomes of SB is emerging rapidly, the research around SB policies is scarce and still in its infancy. The Sedentary Behaviour Research Network was recently established as an international association for researchers and health professionals focusing specifically on SB, to support research in this area [25].

The development of the Global Strategy on Diet, Physical Activity and Health, along with several other global awareness-raising initiatives from the early 2000s, was viewed as a potential turning point after which more countries would establish national policies and strategies related to PA [26]. However, after a decade, the majority of countries had made limited progress on PA policy development [27, 28]. It has been suggested that further research is needed to provide new theoretical and practical insights to inform future PA and SB policy development [16, 17]. Understanding the policy process and impact through robust research and evaluation is crucial for facilitating successful reforms in national health policy [29] and to support all countries to prioritise and commit to increasing PA promotion [30].

A comparative scoping review from 2016 analysed three types of scientific evidence to inform physical activity policy [31] and a structured literature review and citation network analysis published in 2018 mapped the historical development of PA and health research [13]. However, the actual level of development of the PA/SB policy research has never been systematically evaluated. This systematic scoping review of academic and grey literature aimed to map the evidence on the indicators, development, and content of national PA and/or SB policies. We addressed the following four key questions:

(i) Which countries and world regions have been covered by this type of research?; (ii) How is 'policy' conceptualised within the studies and to what extent were PA/SB policy studies based on conceptual/theoretical frameworks?; (iii) Which methods have been used for analysing PA/SB policies?; and (iv) What are the potential future directions of research in this area? This review will help inform national PA/SB policy development, public health promotion of physically active lifestyles, and future research on PA and/or SB policies.

Methods

Literature search

The primary search was performed through PubMed/MEDLINE, Scopus, Web of Science (including Science Citation Index Expanded - SCI-EXPANDED, Social Sciences Citation Index - SSCI, Arts & Humanities Citation Index - A&HCI, Conference Proceedings Citation Index- Science - CPCI-S, and Conference Proceedings Citation Index- Social Science & Humanities - CPCI-SSH), SPORTDiscus, Open Access Theses and Dissertations (OATD), and Networked Digital Library of Theses and Dissertations (NDLTD) databases using the entries *"physical inactivity"*, *"physical activity"*, *sitting*, and *sedentar** in combination with the entries *policy* and *policies*. The full search syntaxes used for each database are available in Additional file 1. The search was performed through titles, abstracts and keywords of the articles. The secondary search was done through the references of all articles selected in the primary search and authors' own archives. Additionally, for governmental reports and other non-academic documents, searches were conducted through Google and websites of the WHO and two major international PA promotion networks: the GoPA and the Active Healthy Kids Global Alliance.

Inclusion criteria

To be included in the review publications had to meet the following criteria:

1. One of the aims of the publication was to analyse PA and/or SB policy or obesity, NCD prevention, sport for all/recreation, and/or other health-related policies that included an analysis of PA and/or SB;

2. The study analysed national-level policies. For federations and multi-state countries, only studies analysing the highest level governmental policies were taken into account (for example Australia and the USA). In the United Kingdom (UK), policy development can occur for all of the UK, as well as for individual home countries. Thus, policies were also included for Scotland, England, Wales, or Northern Ireland, for consistency with previous analyses of national PA/SB policies globally [11, 32–34].

3. The policy analysis was focused on the process of policy development and/or content of policy;

4. The full publication or at least its abstract was available in English.

We excluded publications that: evaluated impact of policy changes on levels of PA or SB; evaluated public opinion and/or knowledge about PA/SB policy/guidelines; analysed international, subnational (e.g. local, regional, territorial, provincial), or non-governmental PA/SB policies/guidelines; focused on policy implementation; or provided general, non-country specific policy recommendations.

Definition of policy

In accordance with Colebatch [35] and Birkland [36], for the purpose of this study we defined public policy as 'a broad orientation', 'an indication of normal practice', 'a specific commitment', or 'a statement of values' [35] with the following attributes: (i) it is made by governments on the *"public's"* behalf; (ii) it is structured as a response to a problem and orientated towards a desired state or a goal to solve the problem; and (iii) it is implemented and interpreted by private and public actors who have various understandings of solutions and problems [36]. It should be noted that this definition does not represent authors' general view on how public policy should be defined. While some studies proposed more specific definitions of policy [11, 26, 37], we used this broad and inclusive definition simply because the aim of our scoping review was to capture all the various research related to PA and SB policy. In previous studies, national PA/SB guidelines were considered as a policy document [38] or a policy paper [39], an area of policy content [40] or an element of a successful policy approach [41, 42]. Some authors suggested, however, a clear distinction should be made between a *policy* (defined as a policy document) and PA and health *guidelines* or *recommendations* [11, 43, 44]. For the purpose of this review we considered national PA/SB guidelines as an indicator of government policy, because the act of issuing national PA/SB guidelines indicates that the government (as their issuing body) has policy supportive of promoting PA and reducing SB. To be as inclusive as possible, in the current study we, therefore, included studies analysing national-level PA/SB guidelines formally adopted and/or published by the government. We acknowledge, however, that there is no consensus among the researchers on this matter and that our definition of national PA/SB guidelines as an indicator of government policy may not necessarily be applicable in future PA/SB studies.

Definition of policy analysis

No consensus has been achieved among researchers on what constitutes a policy analysis. Kustec Lipicer stated

that synonyms for *policy evaluation* available in the literature are *analysis, appraisal, assessment, adjudgement, judgement, examination, critique, review, inspection, measuring* and *grading* of policy [45]. For the purpose of this study we considered the term *policy analysis* broadly and used it as a synonym for *evaluation*, *assessment*, and *review* of policy.

Study selection and data extraction

The study selection was conducted in July 2017, independently by two authors, BKP and GO, whilst a third author, ZP, resolved discrepancies between the study selections. Extraction and tabulation of data was done by one author (BKP). Two authors (BKP and ZP) independently checked for inconsistencies in the extracted data and revised the tables (Additional files 2, 3, 4 and 5). From every included study, we extracted data on its scope (national or international), number of covered countries, focus of the study (including type of the analysed policy, country, and specific target population), the period from which policies were analysed, summary of methods used to analyse policies, and main national-level and international-level findings.

Categorisation of countries

The World Bank's list of 218 economies from June 2017 was used as the list of countries/states/regions/economies [46]. As mentioned above, we included four UK's home nations separately, so the total number of countries encompassed in this review was 221. The authors are aware that some countries/states/regions/economies on the World Bank's list cannot be termed as "countries" because of disputable political and legal issues. However, for the purpose of brevity, we used the term *country* as an abbreviation for "countries/states/regions/economies" on the World Bank's list. The categorisation of the countries into four income groups: low income; lower middle income; upper middle income; and high income, as well as the division of countries into regions was also done using the World Bank's list. According to the list *Europe and Central Asia* constitute one region. To enable drawing conclusions about geographically more specific areas, we additionally divided Europe into four regions as defined by the Publications Office of the European Union (EU) as part of EuroVoc.

Results

General findings

In total, we screened 24,872 documents. Two hundred and three publications [6, 8, 10–12, 26, 32–34, 37–40, 43, 44, 47–234] from 163 original studies met the selection criteria (Fig. 1). A list of all studies with a short description, including the year of publication, key focus, study period, and methods, is presented in Additional file 2. We extracted data from each of the 163 studies (some of which included a single country and

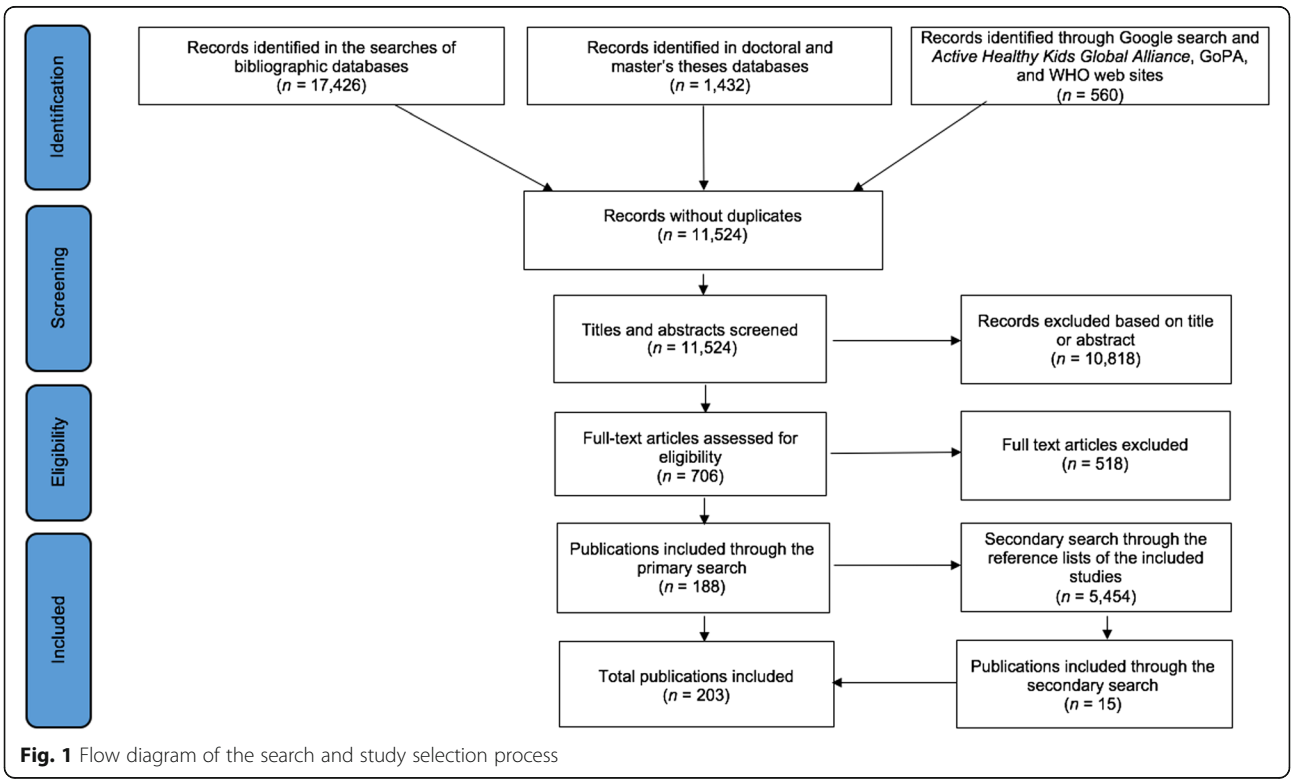

Fig. 1 Flow diagram of the search and study selection process

some of which included multiple countries) to create a breakdown of policy studies for each individual country. If a study included, for example, four countries, it is listed under each of these four countries separately in Additional file 3, creating 635 country-specific policy analyses in total. The full-texts of 12 academic publications were not in English but in Chinese (n = 2), Czech (n = 2), French (n = 2), Korean (n = 1), Portuguese (n = 2), and Spanish (n = 3). These publications were translated into English for data extraction purposes. The selected studies investigated PA and/or SB policies in 168 out of 221 countries worldwide. From these studies, seven were focused exclusively on PA/SB guidelines. The large majority of studies (72%) focused only on one country, whilst the remaining 28% of studies compared or presented an overview of two or more countries. The key findings of the included studies for each of the 168 countries separately are summarised in Additional file 3, whilst international (non-country specific) findings are presented in Additional file 4.

Active Healthy Kids Report Cards for Children and Youth or published articles based on the report card data comprised 40% of all the included studies. The Report Cards are developed under the Active Healthy Kids Global Alliance, a network of researchers, stakeholders, and health professionals [235]. This large international project is based on a Canadian initiative that now includes 38 countries [34]. Some countries like Canada, publish their Report Cards annually, but most other countries published them biennially. The Report Cards aim to assess how each country is performing in promoting and facilitating PA opportunities for children and youth [236]. The common nine indicators incorporated in most countries' report cards are: (i) overall levels of PA; (ii) organized sport and PA; (iii) active play; (iv) active transportation; (v) SB; (vi) support from family and peers; (vii) school environment; (viii) community and the built environment; and (ix) government strategies and investments [237]. A group of experts from each country responsible for the development of the report card assesses performance against each of the indicators and provides usually alphabetical grades for each indicator (from A to F and INC as *incomplete*). The key findings from the last indicator, that is, *Government's Strategies and Investments*, and the respective grade country experts assigned to their country are summarised in Additional file 3, whilst the joint findings and comparison of grades from the 2014 report cards [33] and the 2016 report cards [34] are summarised in Additional file 4.

A major contribution to worldwide PA policy monitoring was also provided by the GoPA [32, 176]. GoPA is a Council of the International Society of Physical Activity and Health (ISPAH), and was established to measure global progress in the area of PA research, surveillance, and policy [176]. GoPA collected data for 217 countries and confirmed data accuracy for 139 countries. For 53 countries, in our overall results, the only data included in the current review were from the GoPA country cards. GoPA developed PA country cards with six key indicators reported by key country informants: (i) general information on the country (including the Capital city, number of inhabitants, and life expectancy); (ii) PA prevalence among adults; (iii) health burden of insufficient PA (not meeting PA guidelines); (iv) existence of a national PA plan (yes/no); (v) information about PA surveillance (presence, year); and (vi) a research output metric based on bibliographical assessment of published peer reviewed journal articles on PA. The fourth indicator on the availability of a national or subnational PA plan was extracted for the purpose of this review. GoPA provided descriptive data on PA policy for 139 countries, which constitutes 22% of all findings identified in this review.

We found some discrepancies in findings, especially for those countries that were analysed by multiple independent studies (see Additional file 3). Some of the possible reasons include: authors' subjectivity in assessment of the data; different methods used for analysing and obtaining the data; different interviewees involved in the study; and actual change in policy that occurred in the periods between studies.

Findings by regions and economic standard

Sixty-nine percent (n = 438) of 635 country-specific policy analyses focused on high-income countries, out of which 63% (n = 277) related to European Union (EU) member states (Fig. 2). No studies were identified for ten out of 81 high-income countries: the Bahamas, the British Virgin Islands, Channel Islands, Curaçao, Gibraltar, Isle of Man, Lichtenstein, Saint Maarten (Dutch part), Taiwan, and Turks and Caicos Islands. For 23 high-income countries only one country-specific policy analysis was found; with most of those findings arising from the GoPA's *1st Physical Activity Almanac* [32]. Middle-income countries were investigated in 29% of country-specific policy analyses, and low-income countries in only 2%. For 21 out of a total of 31 low-income countries globally, and 22 out of 109 middle-income countries, no PA/SB studies were found (Fig. 3). The most eSxtensive policy review for low- and middle-income countries was performed by Lachat et al. [140]. They assessed the existence and content of governmental NCD, health, or nutrition policy documents from 83 WHO member states. However, the paper includes brief findings related to PA policies for only 35 countries. For 7% of all low- and middle-income countries presented in the current review - namely Cambodia, Djibouti, Jamaica, Madagascar, Mauritius,

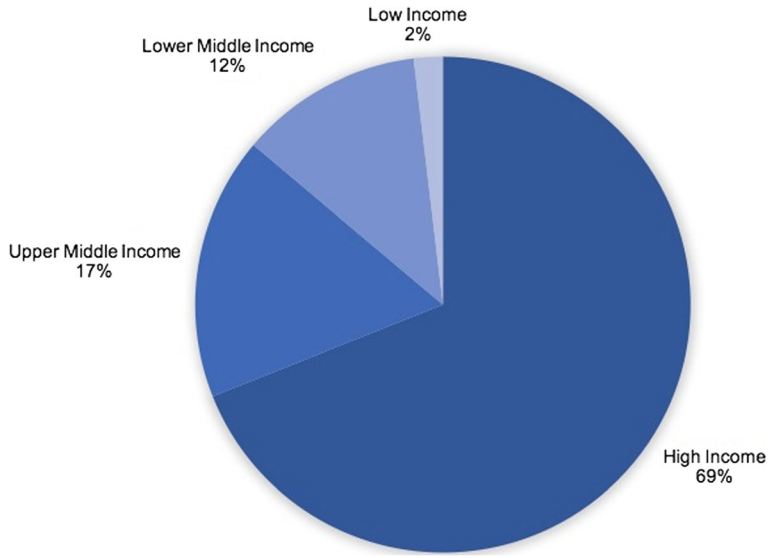

Fig. 2 Distribution of PA/SB policy research across countries by economic standard

Niger, and the Philippines - findings on PA/SB policy were only available from the Lachat et al. [140] paper.

For 63 countries, only descriptive data, stating the existence and/or name of a policy document was found. More detailed analysis of PA related policies were available for Australia [6, 187], Brazil [96, 187], Canada [95, 187, 219], Chile [186], England [40], Finland [10, 39, 84, 187], France [82, 172], Italy [84], Mexico [153], the Netherlands [187], New Zealand [187], Norway [84], Portugal [84], Scotland [187], Slovenia [84], Switzerland [84, 187], and the USA [113]. Analyses of sport or leisure policies that contain substantial information on PA policies were available for Canada [76], Chile [81], China [146, 203], Cameroon [93], Czech Republic [139], England [76, 196], Germany [76], Malaysia [66], the Netherlands [200], New Zealand [66, 168], Norway [76, 195], Portugal [94], the UK [112, 156], and Vanuatu [135] (Additional file 3).

Only 22% of included studies mentioned SB as part of policy, and just one recent study analysed policies related to SB independently of PA policies [38]. Specifically, mentions of SB related policies/guidelines were found in research for Australia [190], Belgium [38], Canada [33], Finland [39], Hong Kong [124], Ireland [118], Iceland [127], Malta [127], New Zealand [149], Russia [127], Switzerland [127], and Sweden [38] (Additional file 3).

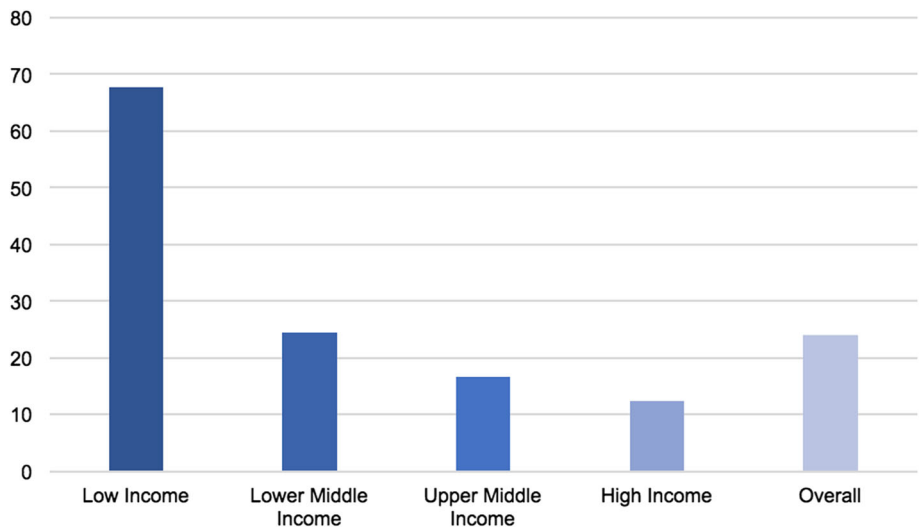

Fig. 3 Percentage of countries with no available PA/SB policy studies; overall and by economic standard

The distribution of PA/SB policy research across countries is presented in Fig. 4. England, Canada, and Finland have been researched the most. Brazil and Mexico were the most represented countries from the Latin American and Caribbean region. In this region, no data were found for Belize, El Salvador, French Guiana, Honduras, Panama, and Suriname. From Sub-Saharan Africa, the most data were available for South Africa. However, Africa in general, both North and Sub-Saharan is the continent with least research found. From the Middle East, Yemen was the only country for which data were not found. The majority of research (55%) concerned European countries. For England, Finland, the Netherlands, and Scotland we found 15 or more studies. Most of the research was in regard to countries in Northern and Western Europe, with on average ten studies per country. Southern Europe had on average five studies per country and Eastern Europe four. From East Asia and Pacific region most data were found for Australia. China was the most researched Asian country.

Conceptualisation of policy, frameworks and methods

A definition of policy, public policy, health policy, and/or PA policy was found in 13% of all included publications. A list of all definitions found in the publications is provided in Additional file 5 [6, 8, 11, 12, 16, 26, 37, 39, 40, 43, 44, 54–56, 62, 86, 92, 95, 103, 113, 129, 140, 153, 168, 171, 185, 187, 218, 228, 229, 231, 238–245]. The most commonly used definition of PA policy was originally proposed by Bull et al. [26]. The conceptualisation of policy varied across studies and often even within the same study. Only 15% of the included studies used a conceptual or theoretical framework. Kingdon's Multiple Streams framework was used in four studies [116, 154, 169, 171]. Elite theory [203], multilevel model of PA promotion [185], figurational sociology [200], institutional change theory [108], the Theoretical Domains Framework, and the Behaviour Change Techniques Taxonomy [39] are among the other frameworks that were used. All four selected doctoral dissertations were based on conceptual/theoretical frameworks [66, 107, 168, 219].

The included studies used a variety of methods for data collection and analysis of PA/SB policy (Additional file 2). All studies relied on some form of literature review. Expert review was used in 46% of the studies. Content analysis of documents was used in 6% of the studies. Interviews (mainly semi-structured) were used in 9% of the studies. Some studies combined both content analysis of interviews and content analysis of documents [115–117, 139, 154]. Interviews were combined with focus groups in two studies [139, 185], and a focus group was combined with content analysis of documents in one study [38]. Discourse analysis was used in 2% of the studies [73, 107, 141, 168], among which half also used interviews as their research method [107, 168]. A case study design was employed in 6% of the studies. A number of studies did not clearly specify their research methods.

Discussion

This is the first systematic scoping review of global PA/SB policy research. We found that PA policy research is much more developed than it was previously considered.

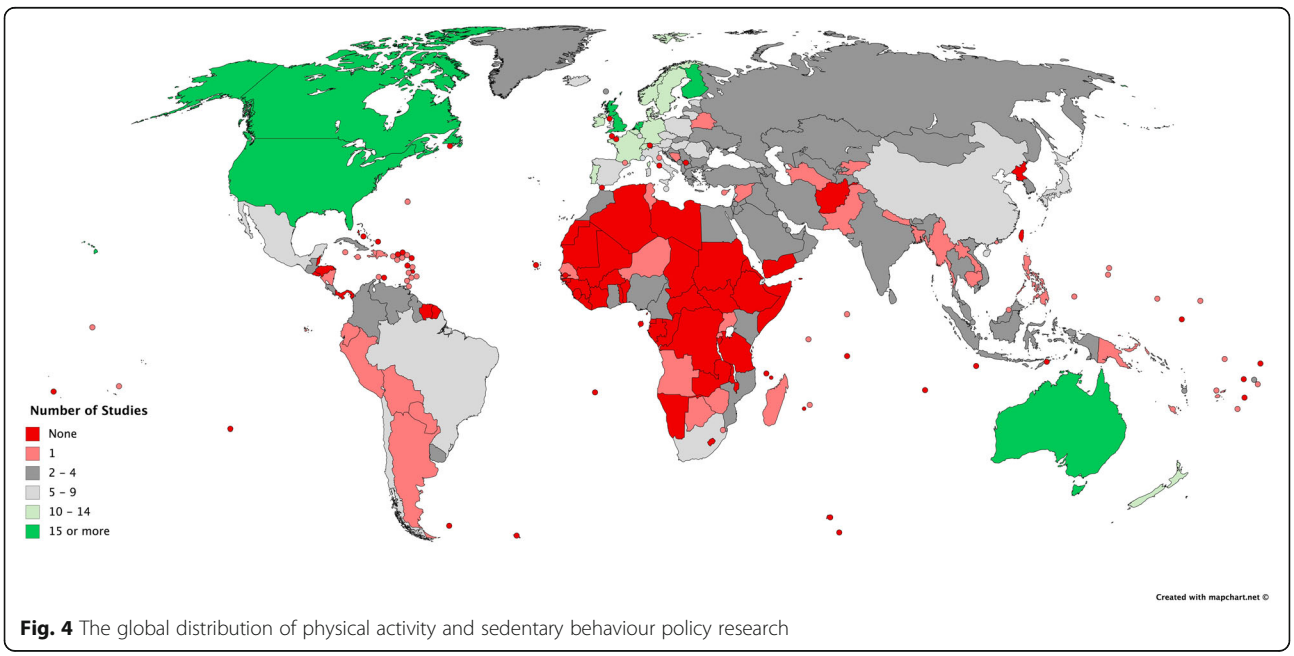

Fig. 4 The global distribution of physical activity and sedentary behaviour policy research

However, there are few examples of policies that included SB. Three key issues were identified that should be addressed in further research: (i) there is a lack of PA/SB policy research in low- and middle-income countries, which is an important limitation of the current body of evidence; (ii) the definition of policy varied significantly across studies, and most studies did not rely on any theoretical framework, which may impede cross-study comparisons; and (iii) studies have used a variety of methods to collect data and analyse policy, which may also cause problems with comparability. Each of these future research directions are discussed further below.

Different studies largely differed in their focus and aims. Accordingly, the depth of analysis varied significantly across studies. The studies that mainly focused on monitoring policies, such as Ramirez Varela et al. [32], may be useful for providing a broad picture on PA policies globally. Studies that reviewed documents and their content in one region, such as Ceccarelli [90] and Kahlmeier et al. [127], can serve as a comparative overview of best practices and a good starting point for further research and more elaborated analyses of national policy. Detailed comparative studies on policies in a few countries, such as Bergsgard et al. [76], may be useful for understanding why some countries are more successful in PA promotion than others. Studies that critically assess PA policy in a single country, for example Milton and Bauman study for England [40] and Craig for Canada [95], may be useful for researchers and policy makers interested in the country's policy situation and possible ways of improving it. Studies focusing on detailed assessment of one policy document, such as Pérez-Escamilla [167], may provide grounds for improving the documents and may be useful for informing the development of similar policy documents in other countries.

Towards more research in low and middle-income countries

Most research was conducted to analyse PA/SB policies in high-income countries, whilst low- and middle-income countries are significantly underrepresented within PA/SB policy research. Most available findings for low- and middle-income countries are provided in the GoPA's *1st Physical Activity Almanac*; hence this publication can be considered an important contribution to the development of PA policy research in these countries. For 17 high-income countries and 36 low- and middle-income countries, the only data we found were from GoPA country cards. Thus the country cards might be considered an important starting point for guiding PA policy developments in countries around the world. However, they merely include a statement about the availability (Yes/No) of the national or subnational PA plan ($n = 47$), the inclusion of PA within a broader NCD policy ($n = 16$), and the name of the available policy document ($n = 76$) as opposed to a detailed analysis of PA/SB policy status.

Another important study providing data for low- and middle-income was a review conducted by Lachat et al. [140], where PA/SB policies were analysed in the broader context of NCD prevention, together with nutrition-related policies. However, due to the fact that this study had a wider scope, only limited data were provided specifically on PA/SB policy. Policy actions and targets related to PA promotion were extracted from the respective documents, so unlike GoPA's country cards, this study reports on some specific content of the policy documents. However, this review [140] provided no references for the reviewed policy document for Costa Rica, Madagascar, Guatemala, Solomon Islands, and Djibouti, which may limit the usability of their findings in future research on PA/SB policies in these countries. Another limitation of this review is that, while reporting on whether inactive lifestyle was discussed within policy documents, it did not distinguish between SB (nowadays defined as prolonged sitting) and inactive lifestyle (traditionally defined as lack of PA). This may cause confusion between the two concepts that the current epidemiological research clearly differentiates [25]. Clearly, more studies comprehensively reviewing PA and SB policies in low- and middle-income countries are needed.

General information on national PA/SB policies can also be found in studies from other sectors, for example NCD prevention [28, 246–249]. However, the depth of information they provide on PA/SB policies is often limited, as these policies are not in their main focus.

Furthermore, for large high-income countries, such as Canada, USA and Australia, a number of studies that analysed subnational (that is state, territorial, provincial, municipal, regional or local PA policies) were identified during the study selection process. For example, in the USA, a number of studies related to school district PA policies were found. Such studies may provide very useful information for PA/SB policy development at a local level and should, therefore, continue to be conducted in countries of both higher and lower economic standard. A separate scoping review of subnational PA/SB policy research is warranted as a systematic assessment of studies on this topic was beyond the scope of the current paper.

Taking into account that, for 53 countries around the world, no PA/SB policy studies were found, continued efforts in PA/SB policy development and research are needed. However, this might also be due to language restrictions, as this review included only studies with titles

and abstracts in the English language. Further research should pay special attention to the low- and middle-income countries and those high-income countries with little or no available data.

Towards a standardised conceptualisation of PA/SB related policies

Policy was differently conceptualised across different studies. In 2006, Schmid et al. wrote that "public health policy around PA remains poorly defined and developed" [16]. Given that only 10% of the selected studies were published before the Schmid et al. paper, the statement about the poor development of PA policy may not be true anymore. However, taking into account the issues with defining and conceptualising PA and SB policy across the studies included in this review, the Schmid et al. statement about the generally poor definition of PA policy remains valid. Schmid et al. conceptualised policy, reflecting political and social commitment, at three levels: (i) formal written codes, regulations or decisions holding legal authority; (ii) written standards that guide choices; and (iii) unwritten social norms that impact behaviours [16]. Among the currently reviewed studies that provided an operational definition of policy, the vast majority conceptualised it within the Schmid et al.'s first level. Many studies relied on the definition of policy provided by Daugbjerg et al. that conceptualises 'policy' as a 'policy document', that is a "written document that contains strategies and priorities, defines goals and objectives, and is issued by a part of the administration" [11]. This definition was later used as the working definition in the WHO and the European Commission in their joint reports of the National Information Focal Points meetings [228]. Rütten et al. for example stated that their approach is grounded on a broader definition of policy than the one proposed by the WHO, which also includes informal institutional procedures, arrangements and rationales for action on health- related issues [185]. The most often used definition of PA policy was proposed by Bull et al., which defines it as a "formal statement that defines physical activity as a priority area, states specific population targets and provides a specific plan or framework for action" [26]. In most cases, studies focused only on public sector policies, that is, "governmental statements", whilst somewhat less often they also included written statements of NGOs, international organisations, and professional bodies. Some studies, such as Christiansen et al. and Daugbjerg et al., clearly distinguished between policy and other documents such as strategies, action plans, and guidelines [11, 44]. These two studies as well as Al-Bahlani and Mabry [62] made a distinction between policies and legislation. Unlike, for example Coenen et al. [38] who under the category "policy documents" included guidelines, legislation, directives, and codes of practices. Seppälä et al. [39] under "policy papers" also included guidelines, good practice guides, strategies, and action plans. A number of studies did not clearly differentiate between interventions, policies, and policy actions. Some studies, such as Milton and Bauman [40] conceptualised PA policy more comprehensively and considered national recommendations on PA levels, national targets and goals related to PA, public education on PA, and PA surveillance and monitoring as key aspects of national PA policy, whilst others, such as Pate et al. [37] defined it more narrowly as formal written documents providing guidelines on public PA promotion.

Various understandings and conceptualisations of PA policy within and between studies may create confusion within the field and negatively affect comparability of findings, but may also be part of an evolutionary process of reaching a consensus on what PA policy is. However, political scientists have agreed there is likely never to be a universal definition of policy. Policy is a flexible concept used differently in different contexts and on different occasions. It is a "continuing process of social action and interaction" and there are a lot of different ways in which people perceive or perform policy [35]. Using the term "policy" in different ways across different contexts is not necessarily a problem [35]. However, we believe defining it within every specific academic discourse can be beneficial and would significantly contribute to the reduction of analytical weaknesses present in some PA/SB policy studies that, by not providing a clear operational definition of policy, often fail to properly define their object of policy analysis.

The conceptualisation of PA/SB policy depends also on the definition of PA and SB. Even though scientific consensus seems to have been achieved [25], PA is still often confused with sport, physical fitness, and exercise. The inconsistency regarding the definition of SB is even larger, probably because SB research is a much younger field than PA epidemiology. The interchangeable use of the terms 'physical inactivity', 'sedentary lifestyle', 'screen--time', and 'sedentary behaviour' is still very common among scholars [21]. The Sedentary Behaviour Research Network (SBRN) initiated the *Terminology Consensus Project* and suggested definitions of several terms related to SB [25]; yet definitions of some common terms, such as "sedentary lifestyle", have still not been clarified [25].

Finally, only 15% of the PA/SB policy studies relied on theoretical or conceptual frameworks to support their analyses. It is evident that PA/SB policy research should be more grounded in existing frameworks. For example, in 2006, Schmid et al. developed the *Framework for PA Policy Research*. Although this framework was mentioned in several studies [8, 11, 44, 103, 171, 185, 218, 219], only two studies based its content analysis grid on

this framework [11, 44]. Using some of many available theories, frameworks, methods, and concepts available from political science and other established disciplines could positively contribute to the further improvement and standardisation of PA/SB policy research. It should be noted, however, that the diversity of approaches and definitions may sometimes be considered desirable, especially in young fields of research. Advancing to standardisation too soon might hinder the development and exploration of some potentially useful approaches.

Towards a standardised policy analysis

The so-called "policy science" and its main component, policy analysis, have been developing since the 1950s when Harold Lasswell's seminal book *The Policy Sciences – Recent Developments in Scope and Method* was published [250]. However, due to the lack of a universally accepted definition of policy, there is also no universally accepted method to perform policy analysis. This review revealed that the methods used for PA/SB policy research are far from being standardised and that the form of research outputs in this area largely depended on individual approaches. The sage words of the authors of *The Australian Policy Handbook*: "Policy analysis is a balance between art and science." [251] can, therefore, also be applied to research analysing PA/SB policies. While some claim there is no difference between policy analysis, policy assessment, and policy evaluation, some made guidelines on how each one of these should be performed and differentiated from the others [252, 253]. Policy analysis as a *craft* "draws on intuition as much as on method" [254]. Considering that PA/SB policy research is at least 40 years younger than "policy science", it is understandable that it still draws more on intuition than on method. This notion is grounded in the fact that most of the studies included in this review did not rely on specific, conventional policy research methods but usually on narrative literature reviews and expert reviews.

The challenges in policy analysis were clearly outlined in some reviewed studies. For example, the Active Healthy Kids Report Card's indicator titled *Government Strategies and Investments* was assessed against three benchmarks: (i) "evidence of leadership and commitment in providing physical activity opportunities for all children and youth"; (ii) "allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth"; and (iii) "demonstrated progress through the key stages of public policy making (i.e., policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future)" [34]. However, this indicator has been reported as "difficult to grade" [33]. In the first comparative 'Global Matrix' of grades from 2014, one-third of the countries did not grade this indicator and marked it as incomplete [33]. In the second 'Global Matrix' it was reported that only six out of 38 countries marked this indicator as incomplete [34]. Even though the number of countries that assigned grades was higher in the second matrix than in the first one, several Report Cards stated that this indicator is one of the hardest to grade. Some of the reported reasons were: a lack of agreed assessment criteria [147, 149] or specific international recommendations [215]; no well-founded and clear criteria or benchmarks to outline which amount of investments is acceptable or which policy is effective [87]; and the perception that the Report Cards are not fit for policy evaluation purposes [121]. In the results from Qatar's Report Card, it was stated that the grade was assigned "as in most countries" based on the "presence" of national investments and strategies related to children and youth's health and PA [63]. This may not be considered the most informative approach to PA/SB policy analysis.

To support standardised analysis of national policy approaches to PA, the HEPA Europe expert group developed a comprehensive instrument entitled *Health Enhancing Physical Activity Policy Audit Tool* (HEPA PAT) [30, 85], structured around 17 key elements for a successful national approach to PA promotion. Prior to its development, there was no "standardised instrument to capture the relevant policy information in a standardised way or to collate more in-depth data" [30]. HEPA PAT is one of the rare tools that, in addition to PA, also informs on SB policies. The protocol recommends that PAT is completed using a collaborative process and involving multiple sectors. It suggests that responses from all relevant sectors are collected and reviewed collectively and that the process of completion itself can support and strengthen policy development. However, the early experiences of countries developing the HEPA PAT found that between three and 6 months are needed to complete the whole process [42] which is probably the main reason why since its development it has only been used in three other studies [172, 232, 255]. There are, however, promising ongoing initiatives that will likely ensure the implementation of HEPA PAT in more countries internationally. It is also important to mention that the primary purpose of HEPA PAT is limited to policy audit and therefore, it cannot be used for the policy assessment (or grading as in the case of the Active Healthy Kids Report Cards). There seems to be a need for the development of a tool which would allow for rating or assessment of the success and progress of national policies related to PA/SB [30]. More coordinated work on a standardised approach to international analysis of PA/SB policies would significantly contribute to the further development of this research area.

Strengths and limitations of the review

The key strengths of the current review include: (i) the search was conducted through a range of bibliographic databases, reference lists of included articles, and relevant websites, which reduced the likelihood of missing relevant publications; (ii) we used an inclusive search syntax and broad eligibility criteria that allowed us to identify and include relevant studies on a wide range of PA/SB policy topics; (iii) the assessment of eligibility of studies was done in duplicate, which reduced the likelihood of bias in study selection; (iv) we clearly stated the definitions of policy and policy analysis used for the purpose of this review; and (v) full-texts of 12 publications were translated from their original languages into English to allow for data extraction.

This review is subject to some limitations. Firstly, although the literature search was done with no language restrictions, we were able to include only publications with titles and abstracts in English. This may have resulted in the omission of some relevant publications. It should be noted, however, that we included 12 publications with full-texts in languages other than English. Secondly, we did not conduct a formal assessment of study and evidence quality. This was not possible to be done in a systematic fashion, because the included studies were conducted using a wide variety of study designs and methods. Nevertheless, based on the extracted data, we provided a general assessment of the overall completeness of evidence. Finally, we did not conduct an in-depth analysis of PA/SB policies for each specific country. Although such an analysis would be of great value for future research and policy initiatives, it was beyond the scope of this review. Nevertheless, we summarised findings of the included studies for a total of 168 countries.

Conclusion

The results of this systematic scoping review show that PA policy research is much more developed than it was considered several years ago. Research around SB policies is still in its infancy, but it seems to have experienced some positive progress in the last few years. There are still a large number of countries with no or very little research on PA/SB policy, particularly among those with low or middle income. Increased efforts should be made to include such countries into academic discussion on PA/SB policy. Future PA/SB policy studies should also aim towards a clearer conceptualisation of policy, greater reliance on existing theoretical frameworks, and the use and further development of standardised methods for PA/SB policy analysis.

Additional files

Additional file 1: Full search syntaxes used for each database. (PDF 90 kb)

Additional file 2: Description of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies. (PDF 434 kb)

Additional file 3: Summary results of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies: country-specific findings. (PDF 836 kb)

Additional file 4: Summary results of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies: international findings. (PDF 138 kb)

Additional file 5: Definitions of policy in general, public policy, physical activity policy, health policy, and policy document included in studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies. (PDF 114 kb)

Abbreviations

CDC: Centers for Disease Control and Prevention; EU: European Union; GoPA: Global Observatory for Physical Activity; HEPA PAT: Health-enhancing physical activity policy audit tool; HEPA: Health-enhancing physical activity; NCD: Noncommunicable disease; NGO: Nongovernmental organisation; PA: Physical activity; SB: Sedentary behaviour; UK: United Kingdom; UN: United Nations; USA: United States of America; WHO: World Health Organization

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The summary of reviewed articles is available in Figures and Additional files.

Authors' contributions

BKP and ZP conceived the idea for the review. BKP, ZP, SJHB, and KM conceptualised the review. BKP took the lead in writing the study protocol. BKP and ZP designed the systematic search strategies. BKP and GOS conducted the study selection. BKP extracted, tabulated, and analysed the data. BKP and ZP checked for inconsistencies in the extracted data and revised the tables. BKP drafted the initial manuscript. ZP, KM, SB, GOS, AB, FB, SK, and MP contributed to writing the manuscript. All authors read and approved the final manuscript.

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Consent for publication

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Competing interests

The authors declare that they have no competing interests.

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Appendix A2: The development of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework

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The development of the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework

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Abstract

Background: Policy analysis is considered essential for achieving successful reforms in health promotion and public health. The only framework for physical activity (PA) policy analysis was developed at a time when the field of PA policy research was in its early stages. PA policy research has since grown, and our understanding of what elements need to be included in a comprehensive analysis of PA policy is now more refined. This study developed a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework.

Methods: The development of the CAPPA framework was based on: (i) an extensive review of literature; (ii) an open discussion between the authors; (iii) three rounds of a Delphi process; and (iv) two-rounds of consultations with PA policy stakeholders.

Results: The CAPPA framework specifies 38 elements of a comprehensive analysis of PA policies in the following six categories, which comprise the building blocks of the framework: (i) *purpose of analysis* (including auditing and assessment of policies); (ii) *policy level* (including: international; national; subnational; local; and institutional policies); (iii) *policy sector* (including: health; sport; recreation and leisure; education; transport; environment; urban/rural planning and design; tourism; work and employment; public finance; and research sectors); (iv) *type of policy* (including: formal written policies; unwritten formal statements; written standards and guidelines; formal procedures; and informal policies); (v) *stage of policy cycle* (including: agenda setting; formulation; endorsement/legitimisation; implementation; evaluation; maintenance; termination; and succession); and (vi) *scope of analysis* (including availability; context; processes; actors; political will; content; and effects). Based on the CAPPA framework, we also proposed broad and inclusive definitions of PA policy and PA policy analysis.

Conclusion: The CAPPA framework may be used to guide future studies related to PA policy and to provide a context for the analysis of its specific components. The framework could be used in the same way for sedentary behaviour policy research. Future research should examine the extent to which PA policy analysis has covered each of the elements specified in the CAPPA framework and analyse the elements for which evidence is lacking. Future studies should also determine whether the existing tools allow for auditing and assessment of all the CAPPA elements and develop new tools if needed to allow for a more comprehensive PA policy analysis.

Keywords: Physical activity, Policy, Policy analysis, Sedentary behaviour, Framework

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Background

Insufficient physical activity (PA) is among the key risk factors for non-communicable diseases (NCDs), such as type II diabetes, some types of cancer, and cardiovascular disease [1, 2]. NCDs cause the deaths of nearly 40 million people per year world-wide, which is around 70% of overall global mortality [3]. Accordingly, insufficient PA is considered one of the main risk factors for premature mortality worldwide [4]. For example, in 2008, approximately 9% of all deaths globally were attributed to insufficient PA [5]. Insufficient PA is also associated with a range of poor mental health outcomes, such as increased risk of depression [1]. Current inadequate PA levels also generate a significant economic burden for national healthcare systems. Conservatively estimated, physical inactivity costs healthcare systems worldwide around 53.8 billion international dollars, of which 68% is paid by the public sector [6]. Given these large health and economic impacts, investing in PA promotion is widely considered a "best buy" [2, 7]. The significant public health and economic burdens of insufficient PA also emphasise the need for good public health policy related to PA.

In the last two decades, several important events have contributed to PA planning and policy development [8]. One of the initial global-level policy developments in PA promotion occurred in 2004 when the World Health Organization (WHO) issued the *Global Strategy on Diet, Physical Activity and Health* [9]. Subsequently, in 2013, the WHO published the *Global Action Plan for the Prevention and Control of NCDs* [10]. In this document, national governments, as key players in the prevention and control of NCDs, are urged to: establish national NCD targets; develop national NCD plans; and measure their progress in tackling NCDs [10]. The plan provides a menu of policy options for governments and other stakeholders to take action in NCD control and prevention and includes a global target to reduce the prevalence of insufficient PA by 10% by 2025 [10]. In 2018, the WHO launched a *Global Action Plan on Physical Activity* which recommends 20 policy actions [11] and is currently preparing a monitoring framework that will provide member states with methods to appraise progress related to PA policy development. One of the key recommended actions to support the creation of active systems is strengthening of policy frameworks, governance, and leadership systems at both subnational and national levels, to encourage implementation of actions to increase PA [11].

Increasing PA in a population requires culturally adapted, large-scale actions across whole systems, including multiple contexts, such as the health, transport, sport, urban planning, and education sectors [11, 12]. As such, one of the essential determinants of active living is the policy environment [13]. The development and implementation of policies may facilitate the creation of supportive environments for people to engage in physically active lifestyles [14, 15]. Therefore, a vital platform for developing, managing, and providing such actions is a national-level policy [12]. By developing and implementing PA policies, national governments design political and legal frameworks that are necessary for local governments and municipalities to create opportunities and environments for PA and active living [16].

It has been suggested that further research is needed to better inform future PA policy development [8, 17, 18]. Understanding the policy process and impact is essential for facilitating successful reforms [19]. A valuable tool enabling evidence-based development and improvement of policies is *policy analysis*, a "craft" that has been evolving since the 1950s [20, 21]. Policy analysis is perceived as crucial to achieving successful reforms in health promotion [19]. In relation to PA promotion, an analysis of PA-related policies can: raise awareness of current policy gaps and opportunities; demonstrate policy related actions being taken across the system; encourage important debates; contribute to meeting health objectives [22]; provide a catalyst for cooperation and communications across different sectors and levels [12]; and assist decision makers in making better informed choices in a specific problem situation [23].

In a recent systematic review, Klepac Pogrmilovic et al. [24] found more than 150 studies on national-level PA policies, which suggests that this research field is relatively well developed. However, the review also found that very few studies relied on explicit and rigorous conceptual or theoretical frameworks, which may have led to vague and/or varied definitions and conceptualisations of PA policy. The review also found that researchers in this area have not reached consensus on the definitions of PA policy and PA policy analysis [24]. Taking this into account, Klepac Pogrmilovic et al. [24] suggested that more coordinated efforts on a standardised approach to PA policy analysis would contribute to further advancement of this research area [24].

In 2002, a major consultation on PA policy development took place between the WHO and the United States Centers for Disease Control and Prevention (CDC) [25], from which a PA policy framework was recommended. The framework addressed the necessary elements that PA policy needs to encompass [25]. The first and only framework designed specifically for PA policy research was developed by Schmid and colleagues in 2006, to improve categorisation, visualisation, and understanding of PA policy research [17]. The Schmid et al.'s framework is presented as a figure with three 'axes': *policy*, *sector*, and *scale* [17]. The most important axis is the vertical one which presents different ways in which policy may be studied: identifying policies (i.e. description), determinants of

policy, developing and implementing policy, and the impacts of policies [17]. The remaining two axes are: the *sector* axis (including: health; transportation; parks/public spaces; worksite; and school sectors) and the *levels* axis (including: local; regional; state; national; and international policies) [17]. It furthermore conceptualises public policy at three levels as: formal written codes; written standards; and unwritten social norms. The framework was developed through four stages: a literature review; a review of other policy research frameworks; collaborative discussions; and three workshops.

Schmid et al.'s framework was developed at a time when the field of PA policy research was in its early stages, and it provided a useful foundation for several studies undertaken in the field [14, 26–32]. However, PA policy research has since grown as a research area [24, 33], and our understanding of what elements need to be included in a comprehensive analysis of PA policy is now more refined. For example, the scope of Schmid et al.'s framework [17] does not cover formal processes and unwritten formal statements. Also, it is focused primarily on public policies, with less emphasis on non-governmental policies (e.g. private sector policies) related to PA. Furthermore, the framework does not: aim to provide a platform to facilitate a specific policy analysis; take into account all stages of the policy cycle at which policies may need to be studied; or acknowledge that PA policy analysis may be focused on various aspects, such as the content of a policy, the context surrounding a policy, or the actors involved in the development of a policy. Therefore, a more comprehensive framework is needed to reflect this evolving and diversifying field and to better guide contemporary and future PA policy research.

Applying a comprehensive approach to PA policy, with a focus on analysis, may strengthen the evidence base on PA policy development and content, improve comparability between studies, and provide insight into why some countries, institutions, and agencies are more successful in developing enabling contexts within which PA promotion is more likely to happen and achieve real impact. The aim of this paper was to develop a new conceptual framework for PA policy analysis – the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework.

Methods

The development of the CAPPA framework was based on: (i) an extensive review of literature; (ii) an open discussion between the authors; (iii) three rounds of a Delphi process; and (iv) two rounds of consultations with ten PA policy stakeholders. The development of the framework is depicted in Fig. 1. We conducted a systematic literature review to identify studies that analysed national PA and/or SB policies [24]. By reviewing the content of 203 publications included in the review, we found 25 studies that relied on a theoretical or conceptual framework. For the current study, we reviewed the frameworks cited in these studies. Additionally, we conducted an extensive search of the literature on theoretical and conceptual frameworks used for the analysis of other PA policies (not national) and other public health policies. The search was conducted through reference lists of all identified articles in the systematic literature review, authors' own archives, and the Google Scholar database. The initial draft of the CAPPA framework was developed by two authors (BKP and ZP) through a discussion based on the theoretical models and concepts presented in the existing literature related to policy analysis in general [20, 21, 34–40] and policy analysis within the health and PA research field [12, 17, 31, 32, 41–46].

The first draft of the framework was revised on the basis of written comments provided by three authors (GOS, KM, and SJHB) and an open discussion between five of the authors (BKP, GOS, KM, SJHB, and ZP). These five authors were selected purposefully, as each one of them had specific academic expertise important for the development of the framework, including political science (BKP), psychology and qualitative methods (GOS), PA policy analysis (KM), epidemiology of PA and SB (SJHB), and methods and measurement in public health (ZP). The second draft of the framework was further considered by these authors, through a three-staged Delphi decisional process. The purpose of the Delphi process was to: (i) get independent suggestions from the panel members about how to improve the second draft of the framework; and (ii) achieve consensus about the draft framework. The Delphi method was employed to ensure anonymity in the process of reaching consensus on the structure and wording of the draft framework.

The Delphi method is a systematic approach to reaching consensus through interactive communication among experts [47]. The Delphi methodology is often used in PA policy research [48–50], as well as within the field of PA research in general [51]. Various tools may be employed to administer a Delphi process [52, 53]. For the current study, the panel members provided information by completing online surveys. An independent researcher outside the author team and the Delphi panel acted as the moderator for the Delphi process. Before starting each round, the moderator distributed to the panel members an email invitation containing the survey web link and a supplementary file with a detailed explanation of the draft structure of the framework and the definitions of the building blocks of the framework and their elements. After each round, the moderator collected the responses and provided feedback to the panel members. The feedback included summary comments related to each section of

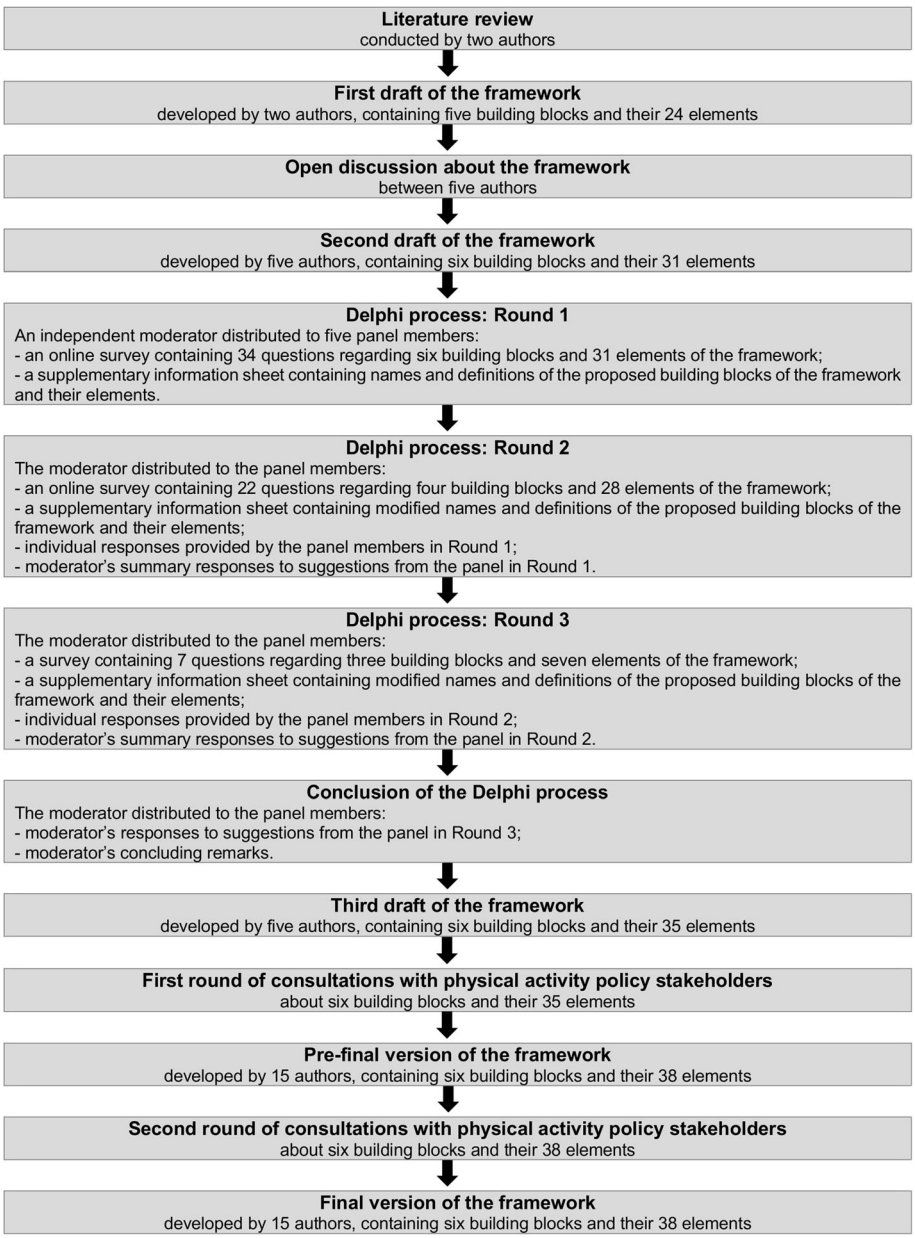

Fig. 1 Summary of the *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework development

the survey as well as anonymised individual responses provided by all panel members.

The first round of the Delphi process covered three key areas: (i) name of the framework; (ii) overall structure of the framework; and (iii) the names and the definitions of all proposed building blocks of the framework and their respective elements. A combination of closed and open-ended questions was used in the survey for each specific section of the framework. For example, in the section of the survey related to the category "purpose of analysis", these questions were posed: (i) "Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the 'Purpose of analysis' category?" (closed "yes/no" response); (ii) "If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?" (open-ended response); (iii) "Do you think any other elements should be added to this category of the framework?" (closed "yes/no" response); and (iv) "If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added" (open-ended response).

The third draft of the framework, developed in the Delphi process, was then revised through two-rounds of consultations with ten PA stakeholders, authors of the paper (AB, ARV, CW, HR, MK, MP, NC, NM, SK, and WB), who were asked to provide their written comments on the building blocks and elements of the framework and their definitions. The members of the consultation panel were selected purposefully, where the criteria for their inclusion in the panel were: (i) they have participated in the development of PA policy; and/or (ii) they are experts in PA policy research. Expertise of the consultation panel members relevant to the development of the framework included: development, implementation, and evaluation of PA policies and programmes; PA surveillance and monitoring; development of PA guidelines; PA interventions; public policy; and building international and global public health capacity. The consultation panel members were selected from various contexts, such as public policy, academia, national and international organisations for PA promotion, and public health consultancy. The comments on the third and pre-final draft of the framework made by the members of the consultation panel were discussed among all fifteen authors, which led to the development of the final version of the framework.

In this paper we relied on the broad and common definition of the term "policy analysis" that is "Policy analysis is any form of policy-relevant research" [54]. Based on the literature review and the CAPPA framework, herein we proposed definitions of PA policy and PA policy analysis that are aligned with a comprehensive approach to analysing PA policies.

Results

The first draft of the framework, developed through the literature review and collaborative discussions of two authors, contained five categories (i.e. building blocks of the framework): *purpose*; *level*; *sectors*; *type of policy*; and *aspect of policy* and their 24 elements. The framework was modified after an open discussion and extensive comments from the remaining authors. The second draft of the framework contained six building blocks of the framework (*purpose of analysis*; *policy level*; *policy sector*; *type of policy*; *stage of policy cycle*; and *scope of analysis*) and their 31 elements. The second draft of the framework was then refined through the Delphi process. During the three rounds, panel members reached consensus on more than 40 discussion points, while the final decision on two discussion points was made by a four-fifths supermajority vote. The Delphi panel agreed on the inclusion and definitions of six building blocks of the framework and their 35 individual elements. The final version of the framework was developed through two rounds of consultations with ten PA policy stakeholders. The consultation panel members made a total of 43 suggestions. Based on the suggestions and following a discussion between all authors of the paper, 32 final changes were made to the framework. This included: (i) changing the names of four elements of the framework; (ii) modification of fifteen definitions; (iii) adding two additional elements to the framework; (iv) dividing one element into two elements; and (v) refining the examples provided for ten elements.

The final CAPPA framework (Fig. 2) specifies 38 elements of a comprehensive analysis of PA policies in the following six categories (i.e. building blocks of the framework): *purpose of analysis* (including: auditing and assessment of policies); *policy level* (including: international; national; subnational; local; and institutional policies); *policy sector* (including: health; sport; recreation and leisure; education; transport; environment; urban/rural planning and design; tourism; work and employment; public finance; and research sectors); *type of policy* (including: formal written policies; unwritten formal statements; written standards and guidelines; formal procedures; and informal policies); *stage of policy cycle* (including: agenda setting; formulation; endorsement/legitimisation; implementation; evaluation; maintenance; termination; and succession); and *scope of analysis* (including: availability; context; processes; actors; political will; content; and effects). In Table 1, we provide the definitions of the building blocks and elements of the framework, together with examples that may facilitate their understanding.

Definitions of PA policy and PA policy analysis

According to the CAPPA framework, PA policy is indicated by the totality of *formal written policies*, *unwritten formal statements*, *written standards and guidelines*, *formal procedures*, and *informal policies* (or lack thereof) that may directly or indirectly affect community- or population-level PA. Accordingly, we defined PA policy analysis as any kind of policy-relevant research that audits or assesses one or more aspects of PA policy.

Discussion

In this study, we developed the CAPPA framework as a conceptual inventory of components necessary for a comprehensive analysis of PA policy, including definitions of two different purposes of analysis, five policy levels, eleven policy sectors, five types of policy, eight stages of policy cycle, and seven elements that reflect the scope of policy analysis. The framework was developed to improve the comprehensiveness and contribute to the standardisation of PA policy analysis research. This comprehensive conceptual framework may serve as a "road map" for researchers and academics interested in PA policy analysis as well as to policymakers and health

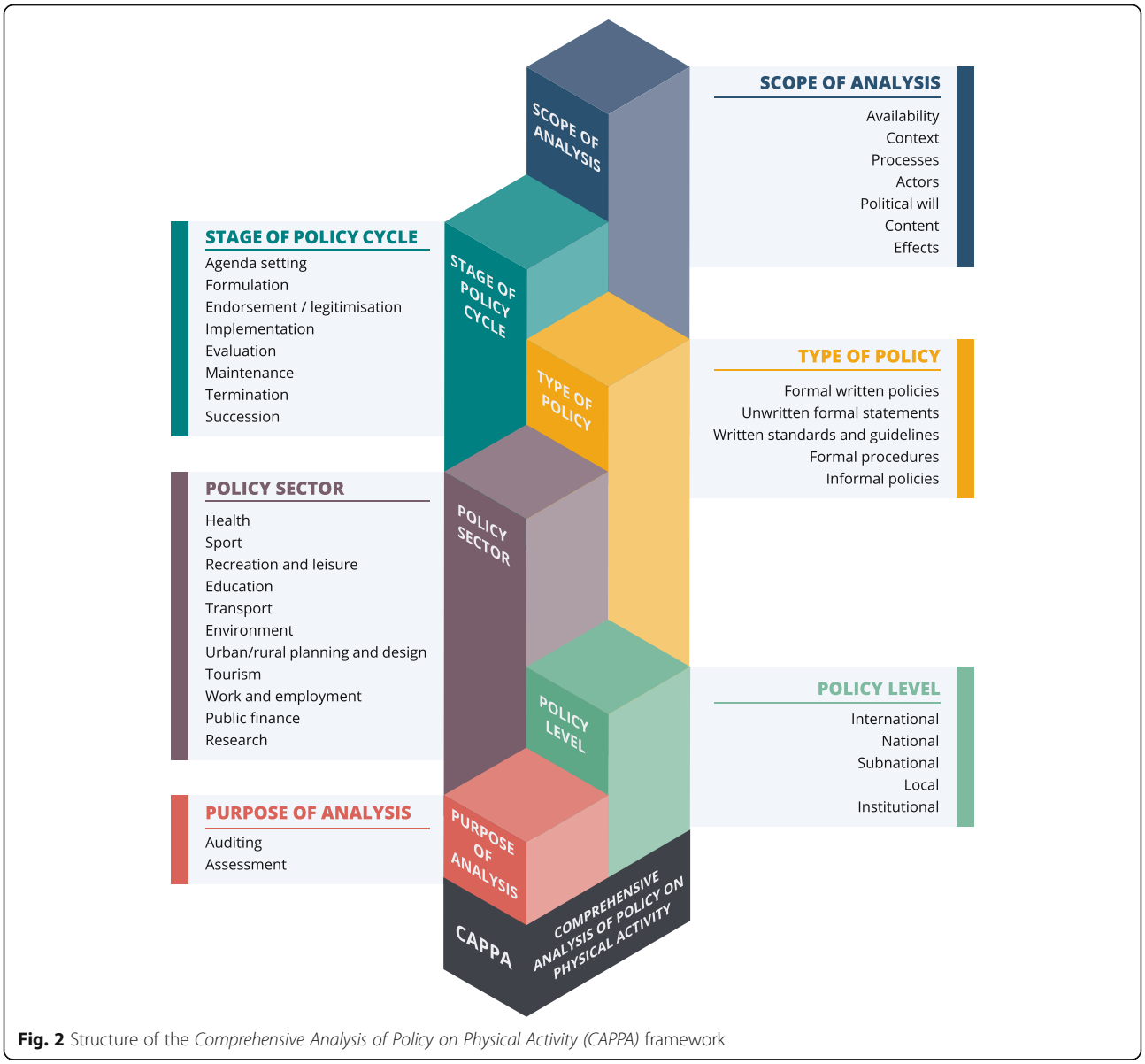

Fig. 2 Structure of the *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework

policy practitioners interested in the development, monitoring, implementation, and analysis of PA policies. The framework can also be used for categorising PA policies or as a classification system for PA policy research. To further facilitate the standardisation of PA policy research, we also proposed definitions of PA policy and PA policy analysis that are aligned with the CAPPA framework.

Purpose of analysis

Studies can be conducted with the purpose of *auditing* and/or *assessment* of PA policies. Policy auditing is a prerequisite for policy assessment, as we first need to know which aspects of policy exist (or existed), before we can assess them. An *assessment* of the aspects of policy identified in the audit process will then determine how good they are against certain standards. For a comprehensive analysis of PA policies, it is important to both audit and assess relevant policies. For example, a country may have a range of national PA policies in place, including a PA strategy and a PA action plan, but it is possible that none of them are evidence based, none of them specify clear targets, none of them define feasible ways to improve population-levels of PA, and none are funded or implemented. Policy *assessment* may need to be done to elucidate some of the important questions about PA policies. It should be noted, however, that policy *auditing* and policy *assessment* may be extremely time-consuming, and it is, therefore, often not practical to conduct both within a single study.

Table 1 Definitions of the building blocks and elements of *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework

Term	Definition, explanation and/or example
PURPOSE OF ANALYSIS	The purpose of a policy analysis
Auditing	Inquiry about a certain aspect of policy but not rating, grading, judging, or evaluating it. An example of a questionnaire item used for this purpose is: "Does Australia have a national PA strategy?".
Assessment	Grading, rating, judging, or evaluating policy. An example of a questionnaire item used for this purpose is: "On the scale from 1 to 10, please rate to what extent is the Australian PA strategy evidence-based?".
POLICY LEVEL	The level on which a policy was enacted and/or implemented
International	Policy that was enacted, endorsed, and/or implemented by an international political body (e.g. a policy of the United Nations).
National	Policy that was enacted, endorsed, and/or implemented by the national government or a governmental body (e.g. a policy of the Australian national government).
Subnational	Policy that was enacted, endorsed, and/or implemented below the national level but above the local level (e.g. a policy of the state government of Victoria, Australia).
Local	Policy that was enacted, endorsed, and/or implemented by a local government (e.g. a policy of the Melbourne City Council).
Institutional	Policy that was enacted, endorsed, and/or implemented by a public or private institution for its own purposes (e.g. a policy of the Melbourne High School).
POLICY SECTOR	The sector in which and/or for which a policy was developed and/or implemented
Health	The health sector includes all policies relevant to products and services for preventive, curative, rehabilitative, or palliative healthcare (e.g. a document by the U.S. Department of Health and Human Services *Physical Activity and Health: A Report of the Surgeon General,* which mentions that healthcare professionals in schools should be especially trained to gain motivational interviewing skills related to PA [55]).
Sport	The sport sector includes all policies that refer to products and services for active or passive engagement of people in sport (e.g. *Scotland's sport strategy for children and young people – Giving children and young people a sporting chance*, which sets out Scottish Government's vision for children and young people's participation in sport [56]).
Recreation and leisure	The recreation and leisure sector includes all policies that refer to products and services for active or passive engagement of people in recreational exercise and other leisure-time physical activities (e.g. *Leisure Strategy and Action Plan 2015–2020* by the City of Darebin, which is a local-level document issued to direct the promotion of mental and physical wellbeing through active lifestyle [57]).
Education	The education sector includes all policies related to providing education to people in educational settings, such as childcare centres, schools, and universities (e.g. *Physical and Sport Education policy* by the State of Victoria, Australia, which states that it is mandatory for all government schools to conduct sport and physical education [58]).
Transport	The transport sector includes all policies related to the transportation of humans, animals, and goods (e.g. *Smarter Travel, A Sustainable Transport Future - A New Transport Policy for Ireland 2009–2020*, issued by the Department of Transport, Tourism and Sport, which aims to support and promote active transportation, in particular walking and cycling [59]).
Environment	The environment sector includes all policies relevant to products and services related to the built and natural environment (e.g. Swiss national *Environment and Health Action Plan,* which aims to double the number of journeys made by bicycles, as they are an example of ecologically sound and health-promoting form of mobility [60]).
Urban/rural planning and design	The urban/rural planning and design sector includes all policies relevant to the design and development of land use, the built environment, and infrastructure in and around urban and rural areas (e.g. Norway's *the Planning and Building Act,* which mentions that configuration of physical surroundings affects the opportunities to engage in PA [61]).
Tourism	The tourism sector includes all policies relevant to attracting, accommodating, and entertaining tourists and organising travel for business and pleasure (e.g. *Switzerland Mobility* programme, a national-level set of resources for bicycling, walking, hiking, and additional activities, which also provides tourism offers [14]).
Work and employment	The work and employment sector includes all policies relevant to the workplace, paid work, volunteer work outside the volunteer's household, employment, and retirement (e.g. A guidance document entitled *Best practices for the assessment and control of physical hazards* by the Government of Alberta, Canada, which states that workers should be encouraged to move around and stand up as much as possible [62]).
Public finance	The public finance sector includes all policies related to allocation of monetary resources (e.g. *The Victorian Budget 2018/19* which includes allocation of AUD 22.7 million to improve the active transportation network [63]).
Research	The research sector includes all policies relevant to systematic creation of new knowledge and the use of the current body of knowledge to creatively generate new outcomes. PA-related policies in this sector may indirectly affect PA in the population (e.g. Canada's *Physical Activity and Sport Act,* which states that the Minister will take appropriate measures to assist in studies or research related to sport and PA [64] or the decision made by a Ministry of Science to allocate additional funds for research on the effectiveness of population-level PA interventions).

Table 1 Definitions of the building blocks and elements of *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework *(Continued)*

Term	Definition, explanation and/or example
TYPE OF POLICY	Type of a policy according to its format (i.e. written or unwritten) and character (i.e. formal vs. informal and binding vs. non-binding)
Formal written policies	Formal written codes, strategies, plans, decisions, regulations, and directives that have been officially enacted and/or endorsed by the governing body at a given level, such as the national government at the national level or a school board at the institutional level (e.g. *Active Victoria, A strategic framework for sport and recreation in Victoria 2017–2021*, issued by the Victorian Government, Department of Health and Human Services [65]).
Unwritten formal statements	Official statements made in public by or on behalf of an official representative that were not put in writing (e.g. statement made by Senator Bridget McKenzie, the Australian Minister for Rural Health, Sport and Regional Communications, in her speech at the Australian Local Government Association's Annual General Assembly about the commitment of the Australian Government to improve PA of people living in regional areas).
Written standards and guidelines	Written policies that guide choices, that is, they only recommend certain behaviours, practices, or processes but do not create an obligation for stakeholder adherence (e.g. *Australia's Physical Activity and Sedentary Behaviour Guidelines*, issued by the Australian Government, Department of Health [66]).
Formal procedures	Formal actions and processes conducted or authorised by an official body or their representatives that are indicative of the body's position or commitment regarding PA (e.g. surveillance of PA through the *Australian Health Survey* commissioned by the Australian Government is an indicator of potential commitment of the Government to support the promotion of PA [67]).
Informal policies	Informal norms, actions, voluntary codes of practice, and processes supported by an official body or their representatives that are indicative of the body's position or commitment regarding PA (e.g. traffic police implement an informal policy based on an unwritten norm not to fine cyclists who ride bicycles on footpaths in areas where there are no designated bike paths, despite the fact that a formal written policy forbids cycling on footpaths).
STAGE OF POLICY CYCLE	A stage in the life cycle of a policy
Agenda setting	A stage in the policy cycle encompassing the processes of problem identification that require attention from the governing body at a given level (e.g. by the national government at the national level or by a school board at the institutional level). Typical examples of questions include: "What informed the agenda setting for the national PA strategy?"; "What processes were undertaken to set the agenda?"; and "Who participated in the agenda setting?".
Formulation	A stage in the policy cycle encompassing the processes included in the development of a policy. It may involve various processes such as setting objectives, conducting consultations with stakeholders, selecting possible solutions to a problem defined in the previous stage, or estimating costs. Typical examples of questions include: "What informed the formulation of the national PA strategy?"; and "Who participated in the development of the policy?".
Endorsement/ legitimisation	A stage in the policy cycle encompassing actions and processes directed at endorsing and/or enacting a policy and ensuring that policy has a required political support. Typical examples of questions include: "Which bodies advocated for the adoption of the national PA strategy?"; "Which official body enacted the policy?"; and "How was the policy enacted, that is, did it involve legislative or executive approval or both?".
Implementation	A stage in the policy cycle encompassing mechanisms and actions used to put a policy into practice. Typical examples of questions include: "Was the policy implemented as intended?"; "How was the policy implemented?"; and "Which bodies participated in the implementation of the policy?".
Evaluation	A stage in the policy cycle encompassing mechanisms and actions used to appraise a specific policy and its impacts. This stage of the policy cycle should not be confused with *assessment* as a purpose of policy analysis. Typical examples of questions include: "Did a governmental body or an independent body appointed by the Government appraise the content of the national PA action plan?"; "What procedures are in place for evaluation of the national PA strategy?"; "Was the impact of national PA guidelines determined by an official body?"; and "What formal procedures are in place to determine the impact of the national PA strategy?".
Maintenance	A stage in the policy cycle defined by continuation of a policy without any changes or with amendments. Typical examples of questions include: "What are the main reasons for the continuation of a policy?"; and "Who made the decision about the policy maintenance?".
Termination	A stage in the policy cycle encompassing actions and processes related to the decision that policy will be discontinued. Typical examples of questions include: "Why was the national PA strategy terminated?"; "Which processes contributed to its termination?"; and "What are the expected consequences of the termination of the national PA strategy?".
Succession	A stage in the policy cycle after the termination of a policy. In this stage, the policy in question may or may not be replaced by another policy. Typical examples of questions include: "Which policies replaced the national PA strategy after its end date?"; "Are all aspects of the discontinued PA strategy covered by the new policies?"; and "Why national PA strategy was not replaced with another policy after its end date?".
SCOPE OF ANALYSIS	The subject matter encompassed by a policy analysis
Availability	Analysis of whether a policy exists or not (e.g. the presence of a national PA plan).
Context	Analysis of the economic, environmental, legal, political, social, and any other circumstances relevant to a policy or a

Table 1 Definitions of the building blocks and elements of *Comprehensive Analysis of Policy on Physical Activity (CAPPA)* framework *(Continued)*

Term	Definition, explanation and/or example
	stage of the policy cycle. Typical examples of questions about context would include: "Were there any specific economic circumstances around the development of the national PA strategy?"; "What budget has been allocated for the implementation of the national PA strategy?"; "What was the key stimulus for a policy action (e.g. the European Union encouraged its member states to develop national PA plans, decision maker's personal involvement in sport and PA promotion, etc.)?"; "What are the dominant values held by the body endorsing the national PA strategy (secular, liberal, conservative, socialist, capitalist, etc.)?"; "What influence does private sector have on policy making process?"; and "Was the local PA policy developed based on the separation of powers doctrine?".
Processes	Analysis of the procedures, mechanisms, and/or actions in a given stage of the policy cycle. Typical examples of questions include: "What processes did the national PA strategy have to go through to become implemented (e.g. after Minister's proposal, the strategy was approved by the Parliament; only one ministry approved and issued the strategy; or several ministries issued the strategy but it was not sent to the Parliament etc.)?"; "Which mechanisms are in place to support the dissemination of PA guidelines (e.g. communication strategy)?"; "Which mechanisms were in place in the development stage of the national PA strategy (e.g. the national PA strategy was developed through inter-ministerial discussions and workshops with key stakeholders)?"; and "Did a development process of the national PA strategy allow for suggestions and improvements to be made?".
Actors	Analysis of the stakeholders in a given stage of the policy cycle. Typical examples of questions include: "Which bodies proposed the national PA strategy?"; "Who were the actors involved in the development of the national PA action plan?"; "Are any non-governmental organisations assisting in the implementation of the national PA strategy?" and "What were the power relations between the actors involved in the development of the national PA strategy?".
Political will	Analysis of the level of political support and/or commitment to a policy in a given stage of the policy cycle. Typical examples of questions include: "Does the Government hold regular discussions with the aim to support the implementation of national PA policy?"; "Did the Government demonstrate political will to support the implementation of the national PA strategy?"; and "Did any political actor in power publicly express support to the development of the national PA strategy?".
Content	Analysis of the wording and substantive information included in a specific policy. Typical examples of questions include: "Does the national PA strategy reference specific target groups?"; "Does the national PA strategy have a clear statement on the timeframe for policy implementation?"; "Does the national PA strategy mention joint collaboration at different levels of government (e.g. local, regional, state)?"; "Are the national PA recommendations in your country fully in line with the WHO Global Recommendations on Physical Activity for Health?"; and "Is the policy content predominantly *downstream* (education, information) or *upstream* (legislation, standards, change of the environment)?".
Effects	Analysis of the economic, environmental, public health, social, and other potential impacts of policy. Typical examples of questions include: "What kind of impact did the national PA strategy have on PA levels?" and "Were there any unintended consequences of the implementation of the national PA strategy?".

Policy level

PA policies can be developed at various levels. The simplest classification found in the literature makes a distinction between PA policies that occur at the national and international levels [68]. PA policies at the national level are usually developed by the Government or a governmental body, but they may also be developed by non-governmental or advisory bodies, and later endorsed by the Government. The ways to classify policies below the national level may vary depending on the country in question and its political system. Policies can be developed and implemented on *subnational* levels such as state, federal, municipal, regional, and provincial. The CAPPA framework was developed with the intention of being as applicable as possible to various political systems. Therefore, we did not distinguish between a range of different levels that are below the national level and above the local level. Instead, we encompassed all such levels with the broad term "subnational". PA policy researchers should, however, clearly distinguish between different *subnational* levels in the context of the political system they are investigating and endeavour to analyse policies separately at each of the levels. Schmid et al.'s conceptualisation of *scale* (i.e. equivalent to *policy level* in the CAPPA framework) does not include the "institutional" level, because their framework focused mainly on public policies [17], that is, the policies related to government actions [34]. In the CAPPA framework we included the "institutional" level, because policies at this level often have a key role in the development and implementation of PA interventions. Furthermore, it can be assumed that policies at one level may influence the adoption and shaping of policies at other levels. For a complete understanding of PA policy, it is therefore important to analyse policies at all levels, as well as to consider their possible interactions.

Policy sector

Policies in a range of sectors may directly or indirectly affect PA levels in the population [41, 69]. This is also acknowledged in the Schmid et al.'s framework [17], which includes five sectors: health; transportation; parks/public spaces; worksite; and school. In the CAPPA framework we built on Schmid et al.'s sectors and added

other sectors that were previously identified as relevant to this research field such as: public finance; research; sport; recreation and leisure; and tourism [11, 17, 41, 69].

It should be noted, however, that policy sectors may be termed differently and overlap more or less, depending on the specific context of a given country. Therefore, the CAPPA sectors should be interpreted in the context of a specific country. Furthermore, we acknowledge that PA policies can, and in many cases should, be cross-sectoral, that is, developed and/or implemented across multiple sectors. When classifying a policy according to the CAPPA framework, one should, therefore, not necessarily try to fit it within a single sector. This may present a methodological challenge in some classifications, but it is inevitable due to the complex nature of PA policies. Future users of the CAPPA framework may choose to report on all sectors to which a policy applies or to prioritise the sector that initiated or is responsible for the policy. For example, in the case of a *Walk to school policy* issued by the Ministry of Education, the priority could be given to the education sector, but a policy analyst could choose to report that this policy also belongs to the transport sector. When making such classifications, it is, therefore, important to clearly describe the criteria that were applied.

We also aimed to clearly differentiate between "sectors" and "settings", because one sector usually includes multiple settings and one setting can belong to multiple sectors. For example, the education sector includes settings such as childcare centres, primary schools, secondary schools, and universities. At the same time, each of these settings is also a part of the work and employment sector, because they employ their staff. There is a vast number of settings that might include PA-related policies, and any attempt to list them all is unlikely to result in an exhaustive inventory. For this reason, in the CAPPA framework we did not provide a list of settings that are potentially relevant from the perspective of a comprehensive PA policy analysis. PA policy researchers should consider analysing PA policies in all the sectors included in the CAPPA framework and in as many relevant settings as possible.

Type of policy

There are different types of policies, and they are not necessarily always in the written form. This has already been acknowledged by Schmid et al. [17]. They conceptualised policy at three levels: (i) formal written regulations, codes, or decisions bearing legal authority; (ii) written standards that guide choices; and (iii) unwritten social norms [17]. *Formal written policies* in the CAPPA framework correspond to Schmid et al.'s first level. *Written standards and guidelines* and *informal policies* in the CAPPA framework correspond to the second level and the third level in the Schmid et al.'s framework [17], respectively. As suggested by Schmid et al., *informal policies* are "considered to be part of culture rather than explicit policy and not a primary focus of initial physical activity policy research" [17]. However, analysing *informal policies* could bring additional valuable insights into overall PA policy directions that may subsequently inform policy decision-making. Policy may be conceptualised in a broader sense to also include *formal procedures* [44] and *unwritten formal statements* [35], which has been acknowledged in the CAPPA framework. Such statements may play an important role in shaping the general policy context within which the dominant beliefs may subsequently get converted into formal written policies. *Formal procedures,* such as PA surveillance, may be indicators of the body's position or commitment regarding PA. Formal procedures are usually (but not necessarily) supported by a formal written or unwritten policy. Furthermore, the analysis of *unwritten formal statements* may also provide valuable insights about the intentions of a given body regarding PA. The definition of *unwritten formal statements* in the CAPPA framework is in line with the definition of public policy as an "authoritative statement by a government about its intentions" [35]. *Unwritten formal statements* related to PA have previously been studied mainly using discourse analysis as a research method [70, 71].

Investigating understudied types of policies may help better elucidate policy-related correlates of PA. For example, a conclusion that a certain country has an underdeveloped PA policy simply based on an analysis that showed it lacks *formal written policies*, may be misleading. The country might have *informal policies* in place that promote PA, and *unwritten formal statements* created through announcements or verbal declarations by its decision makers may indicate the government has well-conceived plans and mechanisms for PA promotion. In a different example, a country might have a well-developed *formal written policy*, but certain *informal policies* and *unwritten formal statements* (or lack thereof) may indicate a lack of political will to support PA promotion. It is important to note, however, that analysing *unwritten formal statements* and *informal policies* could be challenging, as they may be more difficult to identify and evaluate than *formal written statements, written standards and guidelines*, and *formal procedures*.

Stage of policy cycle

The list and definitions of stages of policy cycle in the CAPPA framework, were mainly informed by the health policy and political science literature. The concept of policy cycles was originally "employed prescriptively as a way to organize policymaking", but it further evolved as a framework common for analysing policies [38]. The

WHO specified the following stages of the policy cycle: problem identification and agenda setting; policy formation; adoption; policy implementation; and policy evaluation [42]. Informed by Cairney's conceptualisation of the policy cycle [38], for the purpose of the CAPPA framework we adapted the WHO's five-stage policy cycle to include an additional three elements — maintenance, termination, and succession. The CAPPA framework contains eight stages which is an important advance from the four-stage structure of Schmid et al.'s earlier framework [17].

It should be noted that a policy will not necessarily go through all the stages of the policy cycle. For example, a policy may be enacted by Parliament, but that does not necessarily mean it will ever be implemented in practice. Furthermore, stages in the cycle of a given policy may not necessarily be in the order presented in the CAPPA framework. For example, some policies may be formulated without going through the *agenda setting* stage. Some policies may be formulated, maintained, and terminated without ever being implemented or ever being evaluated. Furthermore, a policy may pass multiple times through the same stage (e.g. a policy can be evaluated on several occasions). For a thorough understanding of a PA policy, it is important to analyse all the stages that it went through.

Scope of analysis

Most previous research on national PA policies has focused on analysing *availability* of policies (i.e. whether specific policies exist) and their *content* (i.e. what information they include) [24]. Analysis of *availability* of policies should not be confused with *auditing* as a purpose of PA policy analysis, because theoretically the availability of policies can be both audited (e.g. using the open-ended questionnaire item: "Please list the PA policies that are available in your country!") and assessed (e.g. using the question: "How would you rate the range of PA policies available in your state compared to the national level?", with the response scale: "Less available policies" / "Similar number of available policies" / "More available policies"). The analysis of policy *content* should not be confused with *assessment* as a purpose of PA policy analysis, because the content of a policy can also be both audited (e.g. using the question "Does the national PA strategy include specific targets for different population groups?", with the "yes/no" response scale) and assessed (e.g. with the question: "On a scale from 0 to 10, please rate the overall quality of the national PA strategy"). For some types of PA policy, the analysis of *content* can be performed by using qualitative methods for content analysis, that is, by coding and interpreting text of written documents, transcribed oral communications, and graphics.

Furthermore, Walt's simple health policy analysis framework distinguishes between four elements: *context, content*, *process*, and *actors* [45]. Context, content, processes, and actors often play pivotal roles in different stages of the policy cycle. In the CAPPA framework, we therefore acknowledge the importance of analysing all these elements in addition to the *availability, political will,* and the *effects* of policies. Political will represents a bridge between public health action and knowledge [72] and is considered to be essential for making changes in public health policy [73]. Political support and commitment to a PA policy are recognised as highly relevant factors for the success of the policy and are, therefore, important parts of a comprehensive PA policy analysis [69, 74–76]. Researchers may be deterred from analysing the effects of PA policies, because these may be difficult to measure. It has therefore been suggested, as one of the key priorities for the progress of the PA policy research field, to develop better tools for analysing the effects of policies [17]. This was recognised by the Physical Activity Policy Research Network (PAPRN) in the USA, which conducted a ten-year study of the effectiveness of policies to increase levels of PA [77]. In 2017, they concluded there is a lack of studies on the outcomes of PA policies [78].

When it comes to an overall policy-making process, political power is often a vital force. In the political arena, various groups exercise their political power to reach their goals, either by advocating for a change or blocking it [79]. In health policy analysis, power is usually considered in relation to two elements of the CAPPA framework; namely, *processes* and *actors* [22]. However, power can also be studied within other elements of the *scope of analysis* category such as *political will* or *context*. *Political will,* necessary to introduce any policy change, may be highly influenced by power relations and values within and outside of the government. For example, members of the government can have a strong political will to increase resources necessary for the implementation of a nutrition and PA strategy that aims to reduce children's obesity rates. However, powerful food industry lobbies may block the strategy implementation, if the proposed measures are not in their best interests.

Definitions of PA policy and PA policy analysis

Within the field of political science, there is no consensus on what constitutes "a policy" or a policy analysis [24]. Similarly, within the PA research field, "PA policy" was defined and conceptualised differently across studies, whilst a large majority of the studies on national PA polices did not explicitly state how they defined PA policy [24]. The majority of studies that provided their operational definition of PA policy conceptualised policy

within Schmid et al.'s first level [24], that is, as the formal written regulation, code, or decision bearing legal authority [17] which corresponds to *formal written policies* in the CAPPA framework. For example, several PA policy studies relied on the definition of a policy that conceptualises 'policy' as a 'policy document', that is, "a written document that contains strategies and priorities, defines goals and objectives, and is issued by a part of the administration" [31, 32, 69]. Restricting the conceptualisation of PA policy only to "written documents" may be practical for researchers, because these types of policies are usually the easiest to identify. However, this approach may exclude other possible aspects of policy such as "unwritten statements". Some health and PA policy researchers based their studies on a broader definition of policy, which besides formal statements also includes informal institutional procedures, arrangements, and justifications for action [44]. We acknowledge that various studies have different purposes and may therefore employ the most suitable definition for the scope of the study. We also acknowledge that it may be impossible to analyse all aspects of PA policy in a single study and that sometimes it may be necessary to reduce the analysis to only one or two aspects of PA policy. However, we believe a comprehensive standardised definition of PA policy may contribute to further development of the PA policy research field. Therefore, based on the CAPPA framework and various understandings of PA policies that were detected in our recent systematic scoping review [24], we defined PA policy broadly, to be as inclusive as possible. We used a similar comprehensive and inclusive approach in defining PA policy analysis, whilst relying on the CAPPA framework and a broad definition of policy analysis from the field of political science [54].

Possible applications of the CAPPA framework in PA policy research

The CAPPA framework can be used for a variety of purposes. These include (but are not limited to): (i) to help PA policy researchers conceptualise their study questions, that is, as a source of ideas what can and should be analysed; (ii) as a benchmark for evaluating what has been done in terms of PA policy research overall, in its specific areas, and in specific contexts (e.g. in specific countries); (iii) as a guide for policymakers, who want to influence population-level PA, on which types of policies and which policy sectors they can focus on in their endeavours; (iv) to help PA policy researchers improve between-study comparability, particularly by using the definitions provided within the framework; (v) to help assess the comprehensiveness and content validity of the available tools for PA policy analysis; and (vi) to guide the development of new PA policy analysis tools, particularly regarding the facets of PA policy they are intended to measure.

A practical example of a possible application of the CAPPA framework can be found in our recent systematic review of instruments for PA policy analysis [80]. For every instrument included in the review we determined whether it was designed for *auditing* or *assessment* of PA policies, which *policy sectors*, *types of policy*, and *stages of policy cycle* it covers, and what is encompassed in its *scope of analysis*. The list of elements of the CAPPA framework served as a benchmark for the assessment of comprehensiveness of the included instruments. An extract (for four sample instruments) from the data extraction table can be found in Table 2. The definitions provided in the CAPPA framework enabled us to conduct the assessments consistently across all instruments and between two authors who took part in the data extraction process. In the same review, we used the CAPPA framework also to guide the synthesis of findings. It enabled us to easily identify which elements needed for a comprehensive analysis of PA policy cannot be analysed using the available instruments.

Applicability of the CAPPA framework to the analysis of sedentary behaviour policy

Research suggests that uninterrupted prolonged periods of sedentary behaviour (SB) (i.e. waking activities in a sitting, reclining, or lying posture with very low energy expenditure) are associated with increased risk of cardiovascular disease, type II diabetes, and some types of cancer [86]. It was estimated that high SB is responsible for nearly 4% of deaths from all causes internationally [5]. It is therefore of public health importance to reduce SB in the population. PA and SB are often considered within the same study, as these behaviours are co-dependent [87]. A recent review found that all but one study that analysed national SB policies also analysed PA policies [24]. Given that PA and SB policy research fields largely overlap and that contexts of PA and SB policies are very similar, the CAPPA framework and definitions analogous to the ones provided for PA policy and PA policy analysis may also be used to guide research on SB policies.

Strengths and limitations of the study

The key strength of this study is a rigorous method used to develop the framework, which included an extensive literature review, three rounds of Delphi process, and two rounds of consultations with stakeholders. The CAPPA framework provides a categorisation of a complex area into measurable component parts. Each of these components is defined, and can be audited and assessed in combination to provide a comprehensive understanding of PA policy. The main strengths of the CAPPA framework are its: (i) comprehensiveness; (ii)

Table 2 An example of a possible application of the *Comprehensive Analysis of Policy on Physical Activity* (CAPPA) framework: an extract from a review of instruments for the analysis of physical activity and/or sedentary behaviour policies

Instrument	CAPPA elements covered by the instrument				
	Purpose of analysis	Policy sector	Type of policy	Stage of policy cycle	Scope of analysis
Health enhancing physical activity (HEPA) policy audit tool (PAT), [12, 61, 81, 82]	Auditing Assessment	Education Environment Health Sport Recreation and leisure Tourism Transport Urban planning and design Work and employment	Formal written policies Written standards Formal procedures	Formulation Implementation Evaluation Maintenance	Availability Context Processes Actors Political will Content
A Graphical, Computer-Based Decision-Support Tool to Help Decision Makers Evaluate Policy Options Relating to Physical Activity [74]	Assessment	None	None	Formulation Implementation	Context Effects Political will
Global Observatory for Physical Activity (GoPA!) questionnaire [83, 84]	Auditing	None	Formal written policies Formal procedures	None	Availability
Analysis of Determinants of Policy Impact [44, 85]	Auditing Assessment	None	Formal written policies Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Content Effects

generalisability to different political contexts; (iii) supporting definitions that underpin each building block of the framework and its elements; and (iv) visual simplicity.

The CAPPA framework is also subject to some limitations. The authors aimed to make the building blocks of the framework and their elements as generalisable as possible, but given a variety of policy contexts internationally, some elements may not be applicable to all countries. Also, due to the complexities in the political context, an overlap between the various elements of the framework was inevitable. Future users of the framework should acknowledge the possible overlap and specify the way they choose to deal with it. Whilst the first draft of the framework was developed based on a comprehensive literature review, due to the wealth of literature in the fields of political science, health policy research, and PA policy research, the authors acknowledge there might be aspects of PA policy analysis that are not encompassed by the CAPPA framework.

Conclusion

The CAPPA framework may be used to guide future studies related to PA policy, provide a context for the description, understanding, and analysis of its specific components and serve as a classification system for research on PA policies. It may also serve as a benchmark for the evaluation of comprehensiveness of existing tools for the analysis of PA policy and guide the development of new tools. The framework can be used in the same way for SB policy research. Operational definitions of different aspects of policy varied significantly across previous studies in this area [24]. The definitions of specific types of policy, aspects of policy, and purposes of policy analysis provided in the CAPPA framework might help in achieving standardisation of terminology in this area and in improving the comparability of findings across different studies. Future research should examine the extent to which PA policy analysis has covered each of the elements specified in the CAPPA framework. Future studies should also evaluate whether the existing tools for PA policy analysis allow for auditing and assessment of all the elements of the CAPPA framework and develop new tools where needed.

Abbreviations

CAPPA: Comprehensive Analysis of Policy on Physical Activity; CDC: Centers for Disease Control and Prevention; NCD: Noncommunicable disease; PA: Physical activity; SB: Sedentary behaviour; WHO: World Health Organization

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Authors' contributions
BKP and ZP conceived the idea for the study. BKP, GOS, and ZP reviewed the literature. BKP and ZP developed the initial version of the framework. BKP and ZP designed the questionnaire and supplementary materials used in the Delphi process. BKP, GOS, KM, SJHB, and ZP, participated in the open discussion and three rounds of the Delphi process about the framework. AB, ARV, CW, HR, MK, MP, NC, NM, SK, and WB participated in the consultation process. All authors participated in the discussion about the final version of the framework. BKP drafted the initial manuscript. ZP, KM, GOS, SJHB, AB, ARV, CW, HR, MK, MP, NC, NM, SK, and WB contributed to writing the manuscript. All authors read and approved the final manuscript.

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Publisher's Note

Appendix A3: A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies

Health Research Policy and Systems

REVIEW Open Access

A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies

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Abstract

Background: This systematic review aimed to identify and critically assess available instruments for the analysis of national-level physical activity (PA) and sedentary behaviour (SB) policies and provide recommendations for their future use.

Methods: We conducted a systematic search of academic and grey literature through six bibliographic databases, Google and the websites of three international organisations for PA promotion to identify instruments that are used or that may be used for national-level PA/SB policy analysis. In order to describe and categorise the identified instruments, we used the Comprehensive Analysis of Policy on Physical Activity framework. This framework specifies the elements of a comprehensive analysis of PA/SB policies through the following categories: purpose, level, policy sector, type of policy, stages of policy cycle and scope of analysis.

Results: Out of 22,071 screened items, 26 publications describing 16 instruments met the selection criteria. All the instruments can be used for analysing PA policy, whilst only two include questions about SB policy. None of the instruments allow for the analysis of all the relevant components of national PA/SB policy. Some important elements of PA policy analysis, such as the tourism and research sectors, the agenda-setting and endorsement/legitimisation stages, and the effects of policy, are addressed by only a few instruments. Moreover, none of the instruments address unwritten formal statements, informal policies, and the termination and succession stages of the policy cycle.

Conclusion: Designing new instruments or adapting existing ones is needed to allow for a more thorough analysis of national PA and SB policies. Given that policy analysis covering all important components of PA/SB policy may be extremely time-consuming, a way forward might be to develop a set of complementary instruments, with each tool collecting detailed information about a specific component.

Keywords: Physical activity, sedentary behaviour, national policy, policy analysis, instrument, tool, framework

Background

In 2008, it was estimated that 1 in 10 deaths worldwide were attributable to insufficient physical activity (PA) [1]. If rates of physical inactivity were to be reduced by just 10% to 20%, between half a million to more than a million lives could be saved each year [1]. It was estimated that, from 2002 to 2011, sedentary behaviour (SB) was responsible for 3.8% of all deaths [2]. Physical inactivity and SB are not just key contributors to global mortality but there is also substantial economic burden to national healthcare systems worldwide associated with these behaviours. Estimates suggest that the lack of PA costs countries around the world over 50 billion dollars a year, of which almost 70% is paid by the public sector [3].

Both SB and insufficient PA are among the key risk factors for non-communicable diseases (NCDs) such as type 2 diabetes, cancer and cardiovascular disease. NCDs are responsible for the deaths of almost 40 million people per year, which is approximately 70% of the overall global mortality [4]. Furthermore, low levels of PA

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and high levels of SB are also associated with negative mental health outcomes [5, 6].

National governments are crucial players in achieving positive changes in population health [7]. Governments are, in cooperation with other public health stakeholders, responsible for creating environments that empower individuals to make health-enhancing decisions [7]. One of the essential determinants of active living is the policy environment [8], and the development and implementation of national policies may contribute to the creation of supportive environments for people to engage in physically active lifestyles [9, 10]. The recent Global Action Plan on Physical Activity 2018–2030, issued by WHO, recommends 20 policy actions that produce multiple social, economic and health benefits, and are applicable to different national contexts [10]. Typical examples of standalone PA policies are national PA action plans (e.g. 'Get Ireland Active!' – the national physical activity plan for Ireland [11]) and national PA strategies (e.g. 'Everybody active, every day' – an evidence-based approach to physical activity by Public Health England [12]). PA and SB policies are also often included in national obesity prevention strategies (e.g. the Mexican National Strategy for the Prevention and Control of Overweight, Obesity and Diabetes [13]), NCD prevention strategies (e.g. National Multisectoral Strategic Plan for Prevention and Control of Non-Communicable Diseases in Namibia 2017/18–2021/22 [14]), and public health strategies (e.g. 'Healthy throughout Life' – the targets and strategies for public health policy of the Government of Denmark, 2002–2010 [15]).

Progress regarding the development of national PA policies has been made in most countries [16]. However, with policy implementation generally being poor, countries are urged to take bold initiatives to address this issue [16]. PA and SB policy analysis can help tackle these challenges through raising awareness of the current opportunities and gaps, promoting important cross-sectoral and cross-level debates [17], providing a platform to improve public policy-making related to PA/SB, contributing to meeting various health objectives [18]. and assisting policy-makers in making better informed decisions [19].

Policy analysis, defined as "*any form of policy-relevant research*" [20], encompasses the use of various instruments, tools and techniques to study established policies as well as their development and consequences [21]. It is a valuable practice for continuous improvement of policies, and it has been developing for almost 70 years [22, 23]. Health policy analysis has a central role in fostering successful health promotion reforms [24]. There is no consensus on how to perform a policy analysis and which method is best [25]. A plethora of instruments, tools and techniques are available for policy analysis in general [23, 26–29], health policy analysis [21, 24, 30], and specific areas within health policy such as chronic illness [31] or obesity policies [32]. Given that contexts and research questions relevant for policy analysis in different areas may greatly differ, not all policy analysis instruments are universally applicable. Several instruments have, therefore, been developed specifically for the analysis of PA and SB policies [33, 34]. The Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework [35] defines 38 elements of a comprehensive analysis of PA and SB policies, through the following 6 categories: 'purpose', which includes 2 elements – auditing and assessment of policies; 'level', which includes 5 elements – international, national, subnational, local and institutional policies; 'policy sector', which includes 11 elements – health, sport, recreation and leisure, education, transport, environment, urban/rural planning and design, tourism, work and employment, public finance, and research; 'type of policy', which includes 5 elements – formal written policies, unwritten formal statements, written standards and guidelines, formal procedures and informal policies; 'stage of the policy cycle', which includes 8 elements – agenda-setting, formulation, endorsement/legitimisation, implementation, evaluation, maintenance, termination and succession of policy; and 'scope of analysis', which includes 7 elements – availability, context, processes, actors, political will, content and effects. The CAPPA framework also provides definitions and key rationales underpinning each category and element of the framework [35]. PA and SB are co-dependent behaviours [36] and the contexts of PA and SB policies are very similar [35]. Owing to these facts, PA and SB policies are very often studied within a single study. A recent review found only 1 study that analysed SB policies independently of PA policies [25]. It was therefore suggested that the CAPPA framework can be used to guide research on SB policies.

Research on PA policies is growing and is much more developed than it was a few years ago [25]. Although SB policy research is still in its infancy, there has been some progress in recent years [25]. Klepac Pogrmilovic et al. [25] found that various definitions were used to conceptualise PA/SB policy as well as various methodological approaches and instruments to perform PA policy analysis. This lack of standardisation may be desirable in young research fields, as it puts less constraints on methodological approaches, and therefore allows empirical evaluation of different methodologies. However, it may also lead to a vague conceptualisation of research questions and can hinder cross-study and inter-policy comparability [25].

The scope and quality of policy analysis and comparability of findings across studies will largely be determined by the quality, comprehensiveness and uniformity of instruments used to perform the analyses. No previous systematic review has summarised information about the instruments used for the analysis of national policies related to PA and/or SB. Therefore, the aim of this systematic literature review was to identify and critically assess available instruments for the analysis of national-level PA/SB policies and provide recommendations for their future use. We aimed to assess the purpose and scope of each instrument, the sectors and stages of the policy cycle they refer to, and the types of policy that they cover.

Methods

Search strategy

The primary search was conducted in six databases, namely Scopus, SPORTDiscus, PubMed/MEDLINE, Web of Science (including Science Citation Index Expanded, Arts & Humanities Citation Index, Conference Proceedings Citation Index – Science, Social Sciences Citation Index and Conference Proceedings Citation Index – Social Science & Humanities), Networked Digital Library of Theses and Dissertations, and Open Access Theses and Dissertations. The search was conducted through titles, abstracts and keywords using the entries 'physical inactivity', 'physical activity', 'sitting' and 'sedentar*', and combining them with the terms 'policy' and 'policies'. A full search syntax is available in Additional file 1. The secondary search was performed through (1) the reference lists of all included publications, (2) citations of the included publications identified by Google Scholar and (3) the authors' own archives. Additional searches were conducted in Google and on the websites of WHO and two large international PA promotion networks – the Active Healthy Kids Global Alliance and the Global Observatory for Physical Activity (GoPA!). We conducted a three-stage screening process that included (1) automatic and manual exclusion of duplicates, (2) manual screening of titles and abstracts, and (3) assessment of eligibility based on full texts. The study selection was completed independently by two authors (BKP and GO) in July 2017. Discrepancies between the study selections were resolved in a discussion with the third author (ZP). If perfect agreement between the three authors had not been reached in the discussion, the final decision was made based on a majority vote. A flow diagram of the search and study selection process is available in Fig. 1.

Study selection and inclusion criteria

In this review, we considered the term 'policy analysis' as a synonym for the terms 'assessment', 'audit', 'evaluation' and 'review' of policy. We relied on the definition of PA policy analysis from the CAPPA framework, a conceptual inventory of components for a comprehensive analysis of PA policies, which can be used to guide the selection of existing instruments for policy analysis or the development of new ones [35]. It defines PA policy analysis as "*any kind of policy-relevant research that audits or assesses one or more aspects of PA policy*" [35]. Although developed primarily to guide the analysis of PA policies, the CAPPA framework can also be used in SB policy research [35].

By instruments, we considered sets of criteria and measurement tools that can be used for any aspect of PA/SB policy analysis. By a 'set of criteria', we considered a collection of principles that may serve as a guide for policy analysis. These sets of criteria do not usually include specific questions that may directly be used for policy analysis. By contrast, 'measurement tools' contain specific questions that may be used in various types of research related to PA/SB policies.

To be included in the review, a publication had to meet the following two criteria:

1) The publication includes an original description of an instrument that has been used or that may be used for national-level PA/SB policy analysis;
2) The abstract and/or the full-text of the publication is available in English.

Data extraction and coding

The following data were extracted for every identified PA/SB policy analysis instrument: (1) whether it addresses PA policy, SB policy or both; (2) whether its purpose is auditing or assessment of policies; (3) what sectors of policy it covers; (4) what types of policies it covers; (5) what stages of the policy cycle it addresses; and (6) the scope of the policy analysis that can be done using the instrument.

To describe and categorise the identified instruments, we relied on the CAPPA framework [35]. We relied on all categories and elements presented in the CAPPA framework with the exception of a policy level category, because this review focused on national-level policies only.

The data extraction and coding were independently conducted by two authors (BKP and ZP). Disagreements between the authors were resolved by a discussion between all authors. Detailed data extraction is available in Table 1.

Results

The primary search identified 19,418 records, leaving 11,524 after the removal of duplicates. Following title and abstract screening, 10,818 documents were excluded. Full-texts of the remaining 706 documents were reviewed, and 17 of them were deemed eligible. In the secondary search,

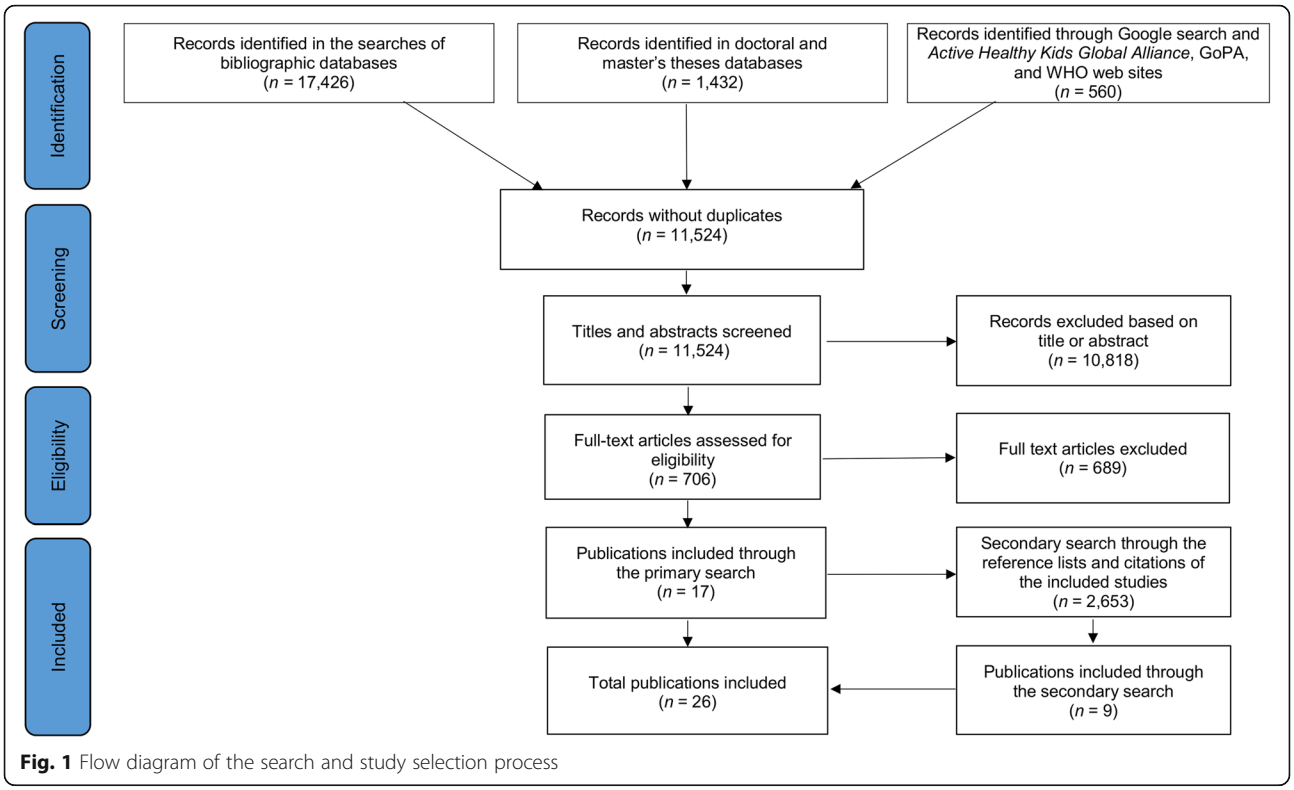

Fig. 1 Flow diagram of the search and study selection process

we identified a further 2653 documents, 9 of which met the inclusion criteria, providing a total of 26 publications for inclusion (Fig. 1). These 26 documents (12 journal articles [17, 38, 41, 45–49, 51, 52, 55, 59], 11 reports [37, 39, 40, 42–44, 50, 53, 54, 56, 58], 2 published questionnaires [33, 57] and 1 unpublished questionnaire [34]) describe 16 instruments. The identified instruments and their assessments against the CAPPA framework are presented in Table 1. A description of included publications and all instruments is available in Additional file 2. Ten included instruments (described in 13 documents) are sets of criteria [37–46, 50, 51, 55]. To help readers understand how these sets of criteria may be used to collect data about PA/SB policy, we developed sample questions based on the items of 1 set of criteria [37] (Additional file 3). Furthermore, the remaining 6 included instruments (described in 13 documents) are measurement tools [17, 33, 34, 47–49, 52–54, 56–59]. All included publications were issued from 2003 to 2017. Eight studies were funded by the European Union (EU) and/or by WHO.

Only 2 included instruments refer to both SB and PA policies [33, 34]. All other instruments refer to PA policies only. The number of items in the included instruments ranges from 2 to 28 (mode = 8). The included instruments differ greatly in terms of their content and structure. Nevertheless, items about some elements of PA policy emerge repeatedly across multiple instruments. Further, 81% ($n = 13$) of instruments contain items about focus of policy on specific target groups, funding and available resources, and leadership and coordination, and 75% ($n = 12$) of instruments address the importance of integration of PA policy in different sectors and settings. Evaluation of policies and surveillance/monitoring of PA/SB are addressed in 69% ($n = 11$) of the instruments. Setting specific goals for PA promotion is mentioned in 56% ($n = 9$) of the instruments, whilst the importance of involving different stakeholders in PA policy is addressed in 50% ($n = 8$) of the instruments. The significance of political support and the existence of PA guidelines as important parts of a successful PA policy are addressed in 44% ($n = 7$) of the instruments. Items about the timeframe for policy implementation and consultations in the policy development process are included in 38% ($n = 6$) of the instruments. Evidence-based PA policy is addressed in 31% ($n = 5$) of the instruments.

Most publications excluded based on the title/abstract were (1) not related to PA/SB (e.g. publications focused on climate change, war, history, racial differences, sedentarism/nomadism, tobacco/smoking, HIV/AIDS, food, etc.), (2) epidemiological studies related to various health issues and (3) PA/SB studies that were not about policies. Most publications excluded based on their full text were (1) focused on PA/SB policies but did not describe and/or use any instrument for policy analysis, (2) described and/or used an instrument for policy analysis that focused on international, subnational, local or

Table 1 Instruments for the analysis of physical activity and/or sedentary behaviour policies and their characteristics

Instrument	Author(s) and publication	Characteristics					
		Includes items on PA, SB or both	Purpose of analysis	Policy sector	Type of policy	Stage of policy cycle	Scope of analysis
Policy principles for the promotion of healthy diets and physical activity	- WHO, 2003 [37]	PA	Auditing Assessment	None	Formal written policies	Formulation Implementation Evaluation	Processes Actors Content
Criteria for successful policy and action plans on physical activity	- Bull et al., 2004 [38] - Bull et al., 2004 [39] - Schöppe et al., 2004 [40]	PA	Auditing Assessment	None	Formal written policies Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Content
A comprehensive physical activity policy framework	- Shephard et al., 2004 [41]	PA	Auditing Assessment	Education Health Sport Recreation and leisure Transport Urban/rural planning and design Work and employment	Formal written policies Formal procedures	Agenda-setting Formulation Implementation Evaluation	Availability Context Processes Actors Political will Content
Elements of national policy documents	- Branca et al., 2007 [42]	PA	Auditing Assessment	Education Health Transport Urban/rural planning and design Work and employment Public finance Research	Formal written policies	Formulation Implementation Evaluation	Context Actors Content
Key principles that should guide member states in the development of national physical activity strategies	- WHO, 2007 [43]	PA	Auditing Assessment	None	Formal written policies Written standards Formal procedures	None	Availability Context Actors Content Effects
Important elements of successful physical activity policies and plans	- WHO, 2007 [44]	PA	Auditing Assessment	None	Formal written policies Written standards	Implementation Evaluation	Context Processes Actors Political will Content
HARDWIRED criteria for successful national physical activity policy	- Bellew et al., 2008 [45]	PA	Auditing Assessment	None	Formal written policies Written standards Formal procedures	Formulation Implementation Evaluation	Context Processes Actors Political will Content
Eight aspects identified as being relevant for effective physical activity policies	- Daugbjerg et al., 2009 [46]	PA	Auditing	None	Formal written policies Formal procedures	Formulation Endorsement/ legitimisation Implementation Evaluation	Actors Content
A graphical, computer-based decision-support tool to help decision makers evaluate policy options relating to physical activity	- Yancey et al., 2010 [47]	PA	Assessment	None	None	Formulation Implementation	Political will Context Effects
Analysis of Determinants of Policy	- Rütten et al.,	PA	Auditing	None	Formal	Formulation	Context

Table 1 Instruments for the analysis of physical activity and/or sedentary behaviour policies and their characteristics *(Continued)*

Instrument	Author(s) and publication	Characteristics					
		Includes items on PA, SB or both	Purpose of analysis	Policy sector	Type of policy	Stage of policy cycle	Scope of analysis
Impact (ADEPT) model	2010 [48] - Rütten et al., 2012 [49]		Assessment		written policies Formal procedures	Implementation Evaluation	Processes Actors Political will Content Effects
Categories for the content analysis of policies	- WHO, 2011 [50] - Christiansen et al., 2014 [51]	PA	Auditing	None	Formal written policies	Formulation Implementation Evaluation Maintenance	Actors Content
HEPA PAT	- Bull et al., 2014 [17] - Bull et al., 2014 [52] - Bull et al., 2014 [53] - Bull et al., 2014 [54] - Bull et al., 2015 [33]	PA and SB	Auditing Assessment	Education Environment Health Sport Recreation and leisure Tourism Transport Urban/rural planning and design Work and employment Public finance Research	Formal written policies Written standards Formal procedures	Formulation Implementation Evaluation Maintenance	Availability Context Processes Actors Political will Content
Government strategies and investments indicator for the Active Healthy Kids report cards	- Tremblay et al., 2014 [55]	PA	Assessment	Public finance	None	Agenda-setting Formulation Implementation Evaluation	Context Actors Political will
Questionnaire on the monitoring framework for the implementation of policies to promote health-enhancing physical activity in the EU and WHO European Region 2015	- WHO, 2015 [56] - European Physical Activity Focal Points Network, 2015 [57]	PA	Auditing	Education Environment Health Sport Recreation and leisure Transport Urban/rural planning and design Work and employment Public finance	Formal written policies Written standards Formal procedures	Implementation	Availability Context Actors Content
Surveillance and policy status indicators for GoPA! country cards	- Ramirez Varela et al., 2016 [58] - Ramirez Varela et al., 2017 [59]	PA	Auditing	None	Formal written policies Formal procedures	None	Availability
GoPA! Policy Inventory version 1.0 (July 2017)	- Global Observatory for Physical Activity, 2017 [34]	PA and SB	Auditing	Education Environment Health Sport Recreation and leisure Transport Urban/rural planning and design	Formal written policies Written standards Formal procedures	Maintenance	Availability Context Actors Content

GoPA! Global Observatory for Physical Activity, *HEPA PAT* Health-enhancing physical activity policy audit tool, *PA* physical activity, *SB* sedentary behaviour

institutional PA/SB policies, or (3) described and/or used an instrument for the analysis of health, sport, obesity, NCD or chronic disease-related policies only, without specific reference to PA/SB policies.

Purpose of analysis

The majority of instruments (56%; $n = 9$) were developed for both policy auditing and assessment purposes [33, 37, 38, 41–45, 48]. Five instruments (31%) were designed only for auditing purposes [34, 46, 50, 57, 58] and 2 (12%) only for assessment purposes [47, 55]. In total, 88% ($n = 14$) of the instruments contain items for auditing and 70% ($n = 11$) contain items for assessment.

Policy sectors

Only 38% ($n = 6$) of the included instruments ask about specific sectors [33, 34, 41, 42, 55, 57]. The number of sectors addressed by these 6 instruments ranges between 1 and 11. One instrument (6%) [33] asks about policies in all 11 sectors included in the CAPPA framework. The 'education', 'health', 'transport' and 'urban/rural planning and design' sectors are the most represented sectors. These are included in 5 instruments that ask about policy sectors [33, 34, 41, 42, 57]. The 'sport' [33, 34, 41, 57], 'leisure and recreation' [33, 34, 41, 57], 'work and employment' [33, 41, 42, 57], and 'public finance' [33, 42, 55, 57] sectors are included in 25% ($n = 4$) of the instruments. The 'environment' sector is addressed in 19% ($n = 3$) of the instruments [33, 34, 57], the 'research' sector in 13% ($n = 2$) of the instruments [33, 42] and 'tourism' is the least represented policy sector, included in only 1 instrument (6%) [33].

Type of policy

The reviewed instruments include items on between 1 and 3 (out of 5) different types of policy (mode = 2). Items about 'formal written policies' are included in 88% ($n = 14$) of the instruments [33, 34, 37, 38, 41–46, 48, 50, 57, 58], followed by items on 'formal procedures' in 63% ($n = 10$) [33, 34, 38, 41, 43, 45, 46, 48, 57, 58] and 'written standards and guidelines' in 38% ($n = 6$) [33, 34, 43–45, 57] of the instruments. None of the instruments include items on 'unwritten formal statements' or 'informal policies'. Finally, 13% ($n = 2$) of the instruments do not address any specific type of policy [47, 55]; they refer to PA policy in general, without specifying the type of PA policy.

Stages of the policy cycle

The reviewed instruments include questions on 1–4 different stages of the policy cycle (modes = 3 and 4) out of 8 possible stages included in the CAPPA framework. The majority of instruments (81%, $n = 13$) include items about the policy 'implementation' stage [33, 37, 38, 41, 42, 44–48, 50, 55, 57]. In total, 69% ($n = 11$) of the instruments include items about the 'formulation' [33, 37, 38, 41, 42, 45–48, 50, 55] and 'evaluation' [33, 37, 38, 41, 42, 44–46, 48, 50, 55] stages. The 'maintenance' stage is addressed in 3 (19%) instruments [33, 34, 50] and 'agenda-setting' in 2 (13%) instruments [41, 55]. Only 1 (6%) instrument includes items on the 'endorsement/legitimisation' stage [46]. None of the instruments include items about the 'termination' and 'succession' stages of the policy cycle. Two (13%) instruments do not include items on any particular stage of the policy cycle [43, 58].

Scope of analysis

The instruments include items on 1–6 elements that fall within the scope of analysis according to the CAPPA framework (mode = 3). The majority of instruments (88%, $n = 14$) include items about 'actors' in the policy process [33, 34, 37, 38, 41–46, 48, 50, 55, 57]. Policy 'content' is addressed in 81% ($n = 13$) of instruments [33, 34, 37, 38, 41–46, 48, 50, 57] and policy 'context' in 75% ($n = 12$) [33, 34, 38, 41–45, 47, 48, 55, 57] of the instruments. Items about policy 'processes' [33, 37, 38, 41, 44, 45, 48] and items about 'political will' [33, 41, 44, 45, 47, 49, 55] are included in 44% ($n = 7$). Items about 'availability' of PA policies are included in 38% ($n = 6$) [33, 34, 41, 43, 57, 58] of the instruments. Items about 'effects' of PA policies are the least represented, as only 3 (19%) instruments include them [43, 47, 48].

Discussion

This is the first systematic review of instruments for the analysis of national PA and SB policies. Although a relatively large number of instruments was identified, none of them cover all elements needed for a comprehensive analysis of PA/SB policy according to the CAPPA framework. Moreover, data on some important aspects of PA/SB policy, including 'unwritten formal statements', 'informal policies', the 'termination' stage and the 'succession' stage cannot be collected by any of the instruments.

All the instruments identified in the current review included items about PA policy, whilst only two asked about SB policy [33, 34]. Research on SB is a much younger field than PA research. Interest in SB as a health risk factor has been developing since 2000 [36]. While the body of evidence on determinants, prevalence, trends and health outcomes of SB is large and rapidly growing, the research on SB policies is still in its infancy [25]. Given the wide recognition of the importance of SB as a health risk factor, this area requires further development of instruments or modification of existing ones to allow for the analysis of SB policies.

The included instruments contain items for auditing or assessment of policy. Policy auditing may be considered a

prerequisite for policy assessment as it is important to find out which aspects of policy exist before they can be assessed [35]. Two included instruments contain only items for PA policy assessment, implying that, if they were to be used, policy auditing first needs to be done using some other instrument [47, 55]. In order to thoroughly understand PA/SB policies, it would be beneficial if they were first audited and then assessed. Therefore, having matching items for both these purposes in a single instrument would allow for an easier and more straightforward analysis and interpretation of results. This potentially useful feature has not been found in any of the included measurement tools.

A comprehensive approach that integrates policies across settings and sectors is considered essential to achieve substantial increases in PA at the population level [9]. Cross-sectoral approaches to policy-making may assist in positioning PA promotion on the agendas of different policy levels and policy sectors [60]. In the PA policy audit of seven European countries, performed using the Health-Enhancing Physical Activity Policy Audit Tool (HEPA PAT), one of the conclusions was that supportive PA-related policies were evident in the health, education and sport sectors, but that more opportunities should be created for supportive policies in other sectors [52]. Most included instruments in this review do not ask about specific sectors. Interestingly, tourism is the least represented sector, addressed in only one instrument [33]; although some authors suggest that this sector may have great potential to contribute to PA promotion [61], this has clearly not yet been sufficiently recognised in instruments for PA policy research.

Formal written policies are, by far, the most represented type of policy in the available instruments. Accordingly, a systematic review found that formal written policies were the most commonly analysed type of national PA/SB policy globally [25]. Items about written standards and guidelines and formal procedures are also well represented in the instruments. By contrast, in the available instruments, no attention has been given to unwritten formal statements and informal policies. Including unwritten formal statements in the analysis of national PA/SB policy could bring additional insights into the comprehensive decision-making processes. As already recognised by Schmid et al. [62] informal policies are "*considered to be part of culture rather than explicit policy and not a primary focus of initial physical activity policy research*". Rütten at al [49]. based their instrument on a broader definition of policy, stating that, besides formal statements and procedures, policy also includes informal procedures, rationales for action and arrangements. However, this was not explicitly reflected in the instrument's items.

In political science, usually, at least five stages are mentioned as crucial for understanding the full life circle of a policy and making sense of the policy process as a whole [63, 64]. Within most reviewed instruments, only a partial, three-stage policy cycle is inquired about, including the development of policy (formulation stage), policy implementation and the evaluation stage. We found only one instrument that includes an item on the endorsement/legitimisation stage of PA policies, which is not surprising given there does not seem to have been much interest in this particular aspect of policy in previous research in this field [25]. It is also possible, however, that the selection of research topics has been determined by the availability of measures. The agenda-setting and maintenance stages are addressed in only a few instruments, while none of the instruments address the termination and succession stages. Analysing PA/SB policy in the context of its full policy cycle, from agenda-setting to the termination or succession stage, is important to gain a more thorough understanding of the whole PA/SB policy-making process.

The majority of instruments are focused on policy content and the actors involved in policy processes. Some of the most common items on actors across the instruments are focused on leadership, coordination mechanisms and organisational structure for PA promotion. Some of the most common items related to policy content are about the target groups and policy's specific goals and objectives. Only a few instruments ask about the availability of PA/SB policies, that is, analysis of whether a specific PA/SB policy exists or not [35]. With regards to the analysis of processes related to PA/SB policy, instruments that include relevant items are mainly focused on the processes of collaboration and/or consultation regarding PA policy. However, a detailed analysis of processes can be performed with very few instruments. For example, little attention has been given to actions and interrelationships between various actors and to formal processes during the development and implementation of policy. Besides, none of the instruments ask about the power relationship in different processes.

The context surrounding policy is addressed in most of the instruments and the respective items focus on the budget/financial resources and political will/support regarding policy implementation. Assessing the national policy context is a significant first step to better PA policy [52]. However, broader, country-specific context, such as religious, social or other values relevant for PA promotion, dominant ideology, and the nature of political systems, was addressed by very few instruments. An examination of a narrow context specifically focused on economic and political circumstances relevant for PA policy may be misleading. If, for example, a researcher does not consider the dominant values of a country, they

may be missing the 'full picture' relevant to understanding how PA promotion in that country really works.

Analysing political, public health, social, economic and/or environmental impacts is one of the key aspects of policy analysis. However, we found only a few instruments that include items about the effects of PA policy. This aspect of PA policy analysis may have been neglected because the effects of PA policies can be complex and challenging to measure. In 2006, the Centers for Disease Control and Prevention highlighted that their "*first priority*" for future research was "*to develop better tools to assess the effects of policies*" [62]. Milton and Bauman [65] also noted that evaluating the effectiveness of PA policy is important to inform future policy development. Such endeavours could be supported by the development of instruments specialised for analysing the effects of PA and SB policies.

Recommendations for the use of instruments for PA/SB policy analysis

We suggest to future users of the instruments, such as policy analysts, policy-makers and other stakeholders, to first use the CAPPA framework as a 'road map' to determine a more specific 'route' to answer their research question [35]. This can help to inform decisions on which particular instrument best meets their needs. All instruments assessed in this review have advantages and disadvantages.

If a comprehensive PA policy analysis needs to be done, HEPA PAT would be the most suitable instrument. Using such a comprehensive instrument has advantages in that it can (1) provide a deeper understanding of the current state of national PA/SB policies and (2) lead to a more detailed insight on what needs to be changed in order to improve policy development and/or implementation. On the other hand, using a comprehensive instrument usually means longer data collection, which may slow down the process of policy analysis, and once the analysis is finally completed, it may already be outdated. According to some experts who are currently using HEPA PAT, if undertaken by a single researcher, the process can take up to more than a year. Therefore, we believe this instrument is especially suitable for an official governmental audit of national PA/SB policy where a team of people is available to work on collecting and analysing the data.

While the HEPA PAT does have one assessment-type question, it is more suitable for an audit than for assessment. Therefore, for assessment purposes, we recommend using the Analysis of Determinants of Policy Impact (ADEPT) Model [48, 49]. This instrument is especially suitable for researchers who wish to conduct interviews with policy-makers. However, the instrument does not mention SB policies, and it relies on a broad definition of policy, which may not be suitable for some researchers who want to use a narrower definition.

It may not always be practical to conduct a comprehensive analysis of PA policy. In such cases, a less comprehensive instrument may need to be considered, albeit on account of gathering less detailed information about a PA/SB policy. If time or capacity is limited, we recommend using the GoPA! Policy Inventory [34]. It contains only 10 questions and is based on HEPA PAT – version 2 [33] and the Questionnaire on the monitoring framework for the implementation of policies to promote health-enhancing physical activity in the EU and WHO European Region 2015 [56].

Some of the instruments are not structured as questionnaires. An example are the eight policy principles for the promotion of healthy diets and PA developed by WHO [37]. If needed for the purpose of data collection, such sets of principles can be easily transformed into questionnaire items. We provided sample questions derived from the WHO's set of principles in Additional file 3. It should be noted, however, that these sample questions have not been developed by the authors of the original instrument and their measurement properties have not been assessed. Rather, these sample questions have been developed exclusively for the purpose of this review to help readers understand how a set of criteria can be transformed into a format suitable for data collection. Depending on their study design, researchers may prefer to develop different questions and use different types of response scales. In any case, it would be important to conduct a study of measurement properties of such newly developed questions before starting the data collection.

All these recommendations are an informed opinion of the authors of this review and should not be taken as an exclusive suggestion to use one instrument over another. The final decision should be left to users, who should independently asses all instruments and decide which is the most suitable for their needs. Table 1 and Additional file 2 can help to facilitate this process.

Towards standardisation of PA/SB policy analysis

The reviewed instruments differ considerably in their structure and comprehensiveness as well as on the aspects of policy they inquire about. This is not surprising, as there is still no consensus among political scientists on what is defined as 'policy' and what constitutes a good policy analysis. Somewhat surprising, however, is the fact that there were large discrepancies even between the instruments developed by the same organisation and/or the same group of authors. This clearly shows that further efforts are needed towards standardisation of PA/SB policy analysis. Despite the large differences between instruments, some themes, such as funding,

specific target groups, political leadership and coordination, multi-sectoral approaches, evaluation, surveillance/monitoring, setting specific goals for PA promotion, and involvement of various stakeholders in PA policy, were found in most of them. This is promising as it suggests a certain level of agreement between researchers about items that are critical for conducting a PA/SB policy analysis. However, there are several reasons for conducting policy analysis and different instruments have been developed for different purposes. Differences between questionnaire items and conceptualisations of PA/SB policy can negatively affect the comparability of findings across studies. Nonetheless, diversity in methodological approaches may sometimes be considered desirable, particularly in younger fields like SB policy research, because it may serve as a catalyst for academic discussions and facilitate the search for optimal solutions, whereas advancing to standardisation too soon might hinder the development of some novel and potentially valuable methods. Therefore, a balanced approach between heading towards standardisation and allowing for diversity in methodological approaches may be a good way to progress PA/SB policy research.

Strengths and limitations of the review

The main strengths of this systematic review are that (1) the search was performed through various bibliographic databases, search engines and websites as well as through the reference lists of all included publications, which reduced the possibility of missing relevant studies; (2) we employed an inclusive search syntax and broad eligibility criteria, which allowed us to find and review various types of instruments that may be used for PA/SB policy analysis; (3) the assessment of eligibility of studies as well as the data extraction from the studies were done in duplicate, which reduced the likelihood of human error and subjectivity; and (4) we based our data extraction on a conceptual framework.

This systematic review is also subject to several limitations. Even though the search was done with no language restrictions, we included only publications with abstracts and/or full-texts in English, which may have led to the exclusion of relevant studies. We focused only on national-level policies, yet we acknowledge that some instruments included in this review may also be used to analyse policies on other levels. We did not conduct a formal quality assessment of the studies and/or instruments given that the included studies varied in their aims and methods. Nevertheless, we provided a general assessment of the instruments and the strengths and limitations of various approaches employed in these.

Conclusions

There is a range of different instruments available that can be used for analysing PA policy, whilst only two instruments include questions about SB policy. None of the instruments allow for the analysis of all the relevant components of a national PA/SB policy. Some important elements of PA policy analysis, such as the tourism and research sectors, the agenda-setting and endorsement/legitimisation stages, and the effects of policy, are addressed by only a few instruments. Moreover, none of the instruments address unwritten formal statements, informal policies, and the termination and succession stages of the policy cycle. Thus, designing new instruments or adapting existing ones is needed to allow for a more thorough analysis of national PA and SB policies. Given that policy analysis covering all important components of PA/SB policy may be extremely time-consuming, a way forward might be to develop a set of complementary instruments, with each tool collecting detailed information about a specific aspect of PA and SB policy.

Supplementary information

Supplementary information accompanies this paper at https://doi.org/10.1186/s12961-019-0492-4.

Additional file 1. Full search syntax used for each database.

Additional file 2. Instruments for the analysis of physical activity and/or sedentary behaviour policies and their description.

Additional file 3. Sample questions for physical activity policy auditing/assessment.

Abbreviations

CAPPA: Comprehensive Analysis of Policy on Physical Activity; EU: European Union; GoPA!: Global Observatory for Physical Activity; HEPA PAT: Health-Enhancing Physical Activity Policy Audit Tool; NCD: non-communicable disease; PA: physical activity; SB: sedentary behaviour

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Authors' contributions

BKP and ZP conceived the idea for the review. BKP, ZP, SJHB and KM conceptualised the review. BKP took the lead in writing the study protocol. BKP and ZP designed the systematic search strategies. BKP and GOS conducted the study selection. BKP and ZP extracted, coded and tabulated the data. BKP and ZP developed the sample questions (Additional file 3). BKP drafted the initial manuscript. ZP, KM, SJHB and GOS contributed to writing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

Full search syntax used for each database is available in Additional file 1. Full descriptions of the instruments and included publications are available in Additional file 2. Sample questions for physical activity policy auditing/assessment derived from one set of criteria are available in Additional file 3.

Ethics approval and consent to participate

Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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Publisher's Note

Appendix A4: National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness

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National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness

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Abstract

Background: Evidence on current, national physical activity (PA) and sedentary behaviour (SB) policies is limited. We, therefore, analysed availability, comprehensiveness, implementation, and effectiveness of PA and SB policies internationally.

Methods: In this cross-sectional study, Global Observatory for Physical Activity (GoPA!) Country Contacts from 173 countries were asked to provide data on their national PA and SB policies by completing GoPA! Policy Inventory. Data were collected for 76 countries (response rate = 44%).

Results: Formal written policies for PA and SB were found in 92% (95% confidence interval [CI]: 86, 98) and 62% (95% CI: 50, 75) of countries, respectively. Sixty-two percent (95% CI: 51, 73) of countries have national PA guidelines, while 40% (95% CI: 29, 52) have SB guidelines. Fifty-two (95% CI: 40, 64) and 11% (95% CI: 3, 19) of countries have quantifiable national targets for PA and SB, respectively. The most represented ministries/departments involved in the promotion of more PA and/or less SB were in the sport (reported by 99% countries; 95% CI: 96, 100), health (97%; 95% CI: 94, 100), education (94%; 95% CI: 88, 100), and recreation and leisure (85%; 95% CI: 71, 99) sectors. The median score (0–10) for the comprehensiveness of PA and SB policies was 4 (95% CI: 4, 5) and 2 (95% CI: 2, 3), respectively. For PA and SB policy implementation it was 6 (95% CI: 5, 6). For the effectiveness of PA and SB policies it was 4 (95% CI: 3, 5) and 3 (95% CI: 2, 4), respectively. PA and SB policies were generally best developed in high-income countries and countries of European and Western-Pacific regions.

Conclusions: Most of the included countries have PA policies, but their comprehensiveness, implementation, and effectiveness are generally low-to-moderate. SB policies are less available, comprehensive, implemented, and effective than PA policies. PA and SB policies are better developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of European and Western-Pacific regions, compared with other world regions. More investment is needed in development and implementation of comprehensive and effective PA and SB policies, particularly in low- and lower-middle-income countries.

Keywords: Physical activity, Sedentary behaviour, Global, Assessment, Audit, Policies

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Background

Insufficient physical activity (PA) and high sedentary behaviour (i.e. activities in sitting or reclining posture requiring low energy expenditure; SB) are jointly responsible for around 13% of deaths globally [1, 2]. Alongside smoking, unhealthy diet, and excessive alcohol consumption, insufficient PA and SB are key behavioural risk factors for the development of noncommunicable diseases [3, 4]. Insufficient PA is associated with a significant economic burden [5]. Its overall direct cost to worldwide healthcare systems is estimated to be around 53.8 billion international dollars [5]. Evidence on the considerable public health and economic benefits that could be achieved by increasing PA in the population has incentivised governments around the world to develop PA policies [6].

Research around PA policy is developing, and some data on PA policy are available for 168 countries [6]. SB policy research is a relatively new area [6], and for most countries evidence is lacking for the development of SB policies [6]. Research on national-level PA and SB policies may contribute to: (i) evidence-based development of new PA and SB policies; (ii) better implementation and evaluation of existing PA and SB policies; (iii) achieving sustainable reforms within the health, education, sport, and other sectors, particularly in regard to the promotion of more PA and less SB; (iv) raising awareness among policy makers and other public health stakeholders about existing challenges, gaps, and prospects in national-level PA promotion; (v) important debates between researchers and policymakers on existing and future PA and SB policies [7–16].

For the past several decades, national and subnational governments, international organisations such as the World Health Organization (WHO), public health researchers, and non-governmental organisations have worked on various initiatives to make the promotion of more PA and less SB a public health priority. In 2018, the WHO launched the *Global Action Plan on Physical Activity 2018–2030* urging countries around the world to implement policy actions that will support efforts to reduce levels of physical inactivity and SB and contribute to meeting the global target of a 15% relative reduction in the prevalence of insufficient PA by 2030 [17].

In 2012, the Global Observatory for Physical Activity (GoPA!) was established to monitor global progress in PA surveillance, research, and policy [18, 19]. The GoPA! is a council of the International Society for Physical Activity and Health [18, 19]. At the time when the GoPA! was established, little data on national PA surveillance, research, and policy were available that would allow for comparisons between different countries and world regions [18, 19]. In 2015, the GoPA! issued PA profiles for 139 countries, the so-called "PA Country Cards" [20]. The data presented in the Country Cards were a valuable starting point towards a better understanding of the global progress on PA policies [6]. The first set of Country Cards included information on research, surveillance and on the availability of national action plans for PA [20]. Including comprehensiveness, implementation, and effectiveness of PA policies as well as SB policy became one of the goals for the Second set of Country Cards to be released by the end of 2020. Furthermore, national policies change over time; hence, information on PA and SB policies needs to the regularly updated [6]. Therefore, the aim of this study was to audit and critically assess the availability, comprehensiveness, implementation, and effectiveness of current national-level PA and SB policies globally.

Methods

Data collection and study sample

The data collection in this cross-sectional study took place from October 2019 to March 2020. GoPA! Country Contacts from 173 countries were invited to participate in the study and provide information on national PA and SB policies in their countries. All GoPA! Country Contacts were invited to participate in the survey, regardless of whether their country had or did not have PA and SB policy. The GoPA! Country Contacts are an established group that were identified by the GoPA!: (i) using PubMed search of the PA literature; (ii) from the list of focal points of international networks for PA promotion; and (iii) from the list of focal points of the WHO regional offices. To be selected, Country Contacts needed to have established experience in the area of public health and PA as researchers, members of international networks for PA promotion or members of government institutions. More details about the selection of GoPA! Country Contacts can be found elsewhere [18, 20]. The *GoPA! Policy Inventory version 3.0* (Additional file 1), was distributed to the GoPA! Country Contacts as an online survey. Responses were obtained for a total of 76 countries (response rate = 44%), of which 51% were high-income, 28% upper-middle-income and 21% low and lower-middle-income. The study sample included countries from all six WHO regions. The most represented region was the European Region (38%), followed by the Region of Americas (22%), the African Region (12%), the Western Pacific Region (11%), the Eastern Mediterranean Region (11%), and the South-East Asia Region (5%). In 12 of the participating countries, we obtained separate responses from two Country Contacts. When their responses differed, we relied on the responses from the main Country Contact listed in the GoPA! Country Cards. Participation in the study was voluntary and all participants provided informed consent before responding to the survey questions. The study protocol was approved by the Victoria

University Human Research Ethics Committee (ref: HRE19–057).

Policy variables

In the *GoPA! Policy Inventory version 3.0,* we used a broad definition of PA policy, as recommended in the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework [21]. PA policy was "indicated by the totality of formal written policies, unwritten formal statements, written standards and guidelines, formal procedures, and informal policies (or lack thereof) that may directly or indirectly affect community- or population-level PA" [21]. Given the large overlap between the PA and SB policy fields, it is suggested that the CAPPA framework can also be used for the analysis of SB polices [21]. Therefore, we used the same broad definition from the CAPPA framework for SB policy.

The *GoPA! Policy Inventory version 3.0* contains 20 questions about national PA and SB policies. The questionnaire was developed based on: the Health enhancing physical activity policy audit tool, version 2.0 [22]; the monitoring framework from the European Union Recommendation on Health-Enhancing Physical Activity Across Sectors [23]; the CAPPA framework; and a year long process of engagement of stakeholders [21]. The questions on the *GoPA! Policy Inventory version 3.0* address the following elements of the CAPPA framework: *availability*; *formal written policies*; *written guidelines; formal procedures; actors*; *implementation;* and *effects* [21]. Specifically, the questions focus on: the availability of national formal written PA and SB polices (e.g., policy documents, legislation, strategies, action plans); national PA and SB guidelines; national targets for PA and SB; health surveillance or monitoring systems that include measures of PA and SB; ministries/departments involved in the promotion of more PA and less SB; and comprehensiveness, implementation and effectiveness of national PA and SB policies. When referring to the *availability of PA and SB policy*, we considered not only the availability of formal written PA and SB policies but also the availability of written guidelines, quantifiable targets, and national PA and SB surveillance or monitoring, because these are indicators of a government's commitment or intention to support the promotion of more PA and less SB in the population [21]. The questions on comprehensiveness, implementation, and effectiveness of policies had ordinal response scales (0–10), with a higher value on the scale representing a better score. Detailed definitions of comprehensiveness, implementation and effectiveness of PA and SB policies are provided in Additional file 1.

Data analysis

The data were analysed using IBM Statistical Package for the Social Sciences (SPSS), version 23 (SPSS Inc., an IBM Company, Chicago, IL, USA). Ordinal data on comprehensiveness, implementation, and effectiveness of policy were presented using medians (and their 95% confidence intervals [CI]) and interquartile ranges. Categorical data were presented as percentages and their 95% confidence intervals. Data were analysed for the whole sample and stratified by WHO regions and country's income level (GNI per capita, calculated using the Atlas method) according to the World Bank [24]. Differences in PA and SB policy between low-, middle, and high-income countries and between the WHO regions were analysed using the Kruskal-Wallis test, for ordinal variables, and chi-square test for categorical variables. The percentage of missing data was relatively low (range across variables: 0–9.2%, mean: 3.3%). In the analyses, we used pairwise deletion of missing data. We considered $p < 0.05$ as a threshold for statistical significance.

Categorisation of countries

The list of 218 economies from June 2019 provided by the World Bank was used as the list of countries/states/economies [24]. The authors are mindful of the fact that some countries/states/economies on the World Bank's list cannot be termed as "countries" because of unclear legal and/or political status. Nevertheless, for brevity purposes, we used the term "countries" as an abbreviation for "countries/states/economies". In order to be consistent with previous analyses of national PA and SB policies globally, both by GoPA! [20] and other international organisations for PA promotion [25, 26], we separately analysed the four United Kingdom home nations; namely, England, Northern Ireland, Scotland, and Wales. The countries were divided into three groups by income level: high-income; upper-middle-income; and low and lower-middle-income, in accordance with the categorisation provided by the World Bank [24]. The two lowest income groups were merged into one, because of a small number of low-income countries in the sample. The countries were also categorised into the six WHO world regions: African Region; European Region; Eastern Mediterranean Region; Region of the Americas; South-East Asia Region; Western Pacific Region.

Results

Availability of PA and SB policies

Formal written PA and SB policies

We found that 92% (95% CI: 86, 98) of countries have national policy documents, legislation, strategies, or action plans that outline the government's intention to increase PA. National policy documents, legislation, strategies or action plans that outline the government's intention to tackle SB were found in 62% (95% CI: 50, 75) of countries. We found a total of 251 PA and SB

policies. Sixty-eight per cent of all policies were published between 2015 and 2020.

The availability of national policies that aim to increase PA and tackle SB across different groups by income level and world regions is summarised in Fig. 1. We found significant differences in the availability of national policies to increase population PA between country groups by income level ($p < 0.001$) and between world regions ($p = 0.007$). We did not find a significant difference in the availability of national policies to tackle population SB by income level ($p = 0.396$) or by world region ($p = 0.135$).

PA and SB guidelines

We found that 62% (95% CI: 51, 73) of countries have national PA guidelines, while 40% (95% CI: 29, 52) have guidelines for SB. The availability of national PA and SB guidelines across different income levels and world regions is summarised in Fig. 2. We found significant differences in the availability of PA guidelines between country groups by income level ($p < 0.001$) and between world regions ($p = 0.002$). We also found a significant difference in the availability of SB guidelines between country groups by income level ($p = 0.028$). We did not find significant differences in the availability of SB guidelines by world regions ($p = 0.226$).

A large majority of countries have specific PA guidelines for *early years* (66%; 95% CI: 53, 79), *children and young people* (82%; 95% CI: 71, 92), *adults* (78%; 95% CI: 67, 89), and *older adults* (72%; 95% CI: 60, 84). About half of the countries have specific SB guidelines for *early years* (39%; 95% CI: 24, 54), *children and young people* (45%; 95% CI: 30, 60), *adults* (51%; 95% CI: 36, 67), and *older adults* (44%; 95% CI: 29, 59; Fig. 3). Specific national PA and SB guidelines for pregnant women, people with disabilities, and people with chronic disease were less well represented.

National targets for PA and SB

The availability of quantifiable national targets for PA and SB across countries with different income levels and world regions is presented in Additional file 2. Overall, 52% (95% CI: 40, 64) and 11% (95% CI: 3, 19) of countries reported having quantifiable national targets for PA and SB, respectively. We found significant differences in the availability of quantifiable national targets for PA between country groups by income level ($p = 0.049$) and between world regions ($p = 0.027$). We did not find significant difference in the availability of quantifiable national targets for SB by income level ($p = 0.262$) or by world region ($p = 0.206$).

National PA and SB surveillance/monitoring

The percentages of countries with national health surveillance or monitoring system that include measures of PA and SB, by income level and world regions, are presented in Additional file 3. Overall, 71% (95% CI: 60, 81) of countries have a national health surveillance or monitoring system that includes measures of PA, and 51% (95% CI: 39, 63) of countries have a national health surveillance or monitoring system with measures of SB. We did not find significant differences in the availability of national health surveillance/monitoring systems that include measures of PA and SB between countries with different income levels or between world regions.

Ministries/departments involved in the promotion of more PA and less SB

The most represented ministries or departments with an active role in the promotion of more PA and/or less SB were in the sectors of: *sport* (reported by 99% of countries; 95% CI: 96, 100); *health* (97%; 95% CI: 94, 100); *education* (94%; 95% CI: 88, 100); *recreation and leisure* (85%; 95% CI: 71, 99); and *research* (68 95% CI: 26, 12).

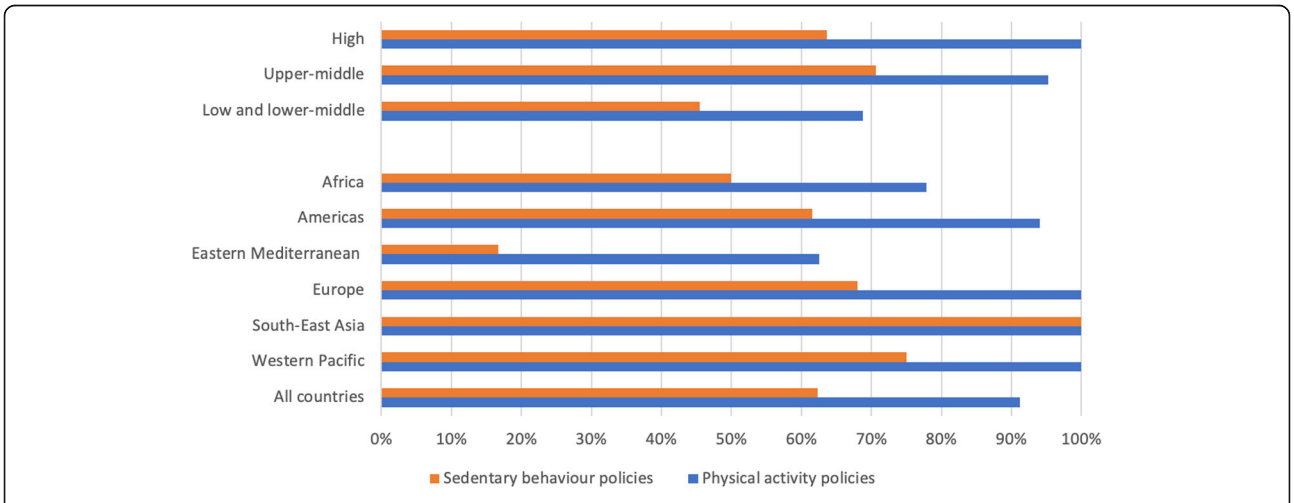

Fig. 1 Percentage of countries with PA and SB policies, by income level and world region. PA: physical activity, SB: sedentary behaviour

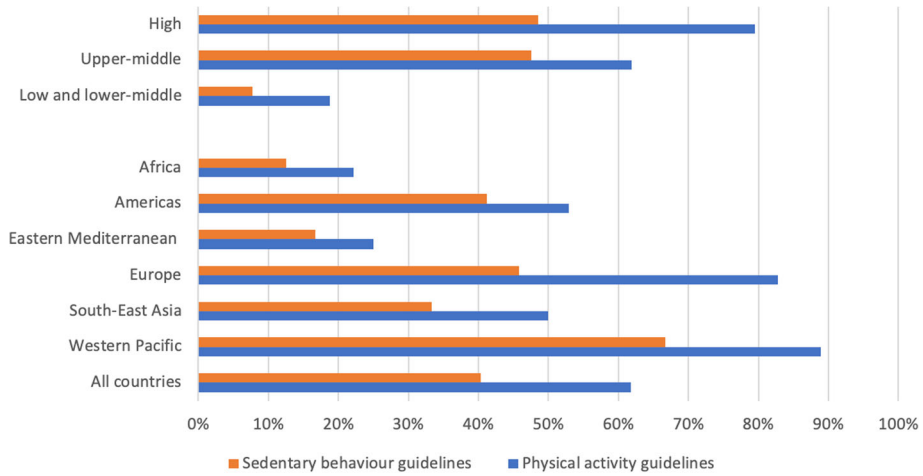

Fig. 2 Percentage of countries with national PA and SB guidelines, by income level and world region. PA: physical activity, SB: sedentary behaviour

This was followed by the ministries or departments of *transport* (60%; 95% CI: 56, 74), *urban/rural planning and design* (60%; 95% CI: 45, 75), *tourism* (46%; 95% CI: 30, 62), *culture* (44%; 95% CI: 29, 59), *environment* (43%; 95% CI: 27, 58), *work and employment* (39%; 95% CI: 24, 54), and *public finance* (28%; 95% CI: 13, 42). The percentage of national ministries or departments involved in promotion of more PA and/or less SB are presented in Additional file 4.

Comprehensiveness of PA and SB policies

The distribution of national PA and SB policies according to their level of comprehensiveness is presented in Fig. 4. We found that PA policy in 39% (95% CI: 28, 51) of countries includes only around half of the important elements of a comprehensive approach (the list of elements can be found in Additional file 1), while in 27% (95% CI: 17, 37) of countries PA policy contains most of the important elements. A low level of comprehensiveness was found for PA policy in 28% (95% CI: 18, 39) of countries, while in 6% (95% CI: 0.3, 11) of countries PA policy covers no important elements. No countries reported having PA policy that includes all important elements. The median score for the comprehensiveness of PA policy was 4 (95% CI: 4, 5).

In most of the included countries, SB policy was assessed as having low comprehensiveness (48%; 95% CI: 35, 62) or as covering no important aspects (19%; 95% CI: 8, 29). Twenty-six per cent (95% CI: 14, 38) of countries reported having SB policy that includes only around half of important elements, while in 7% (95% CI: 0.4, 14) of countries SB policy contains most of the important

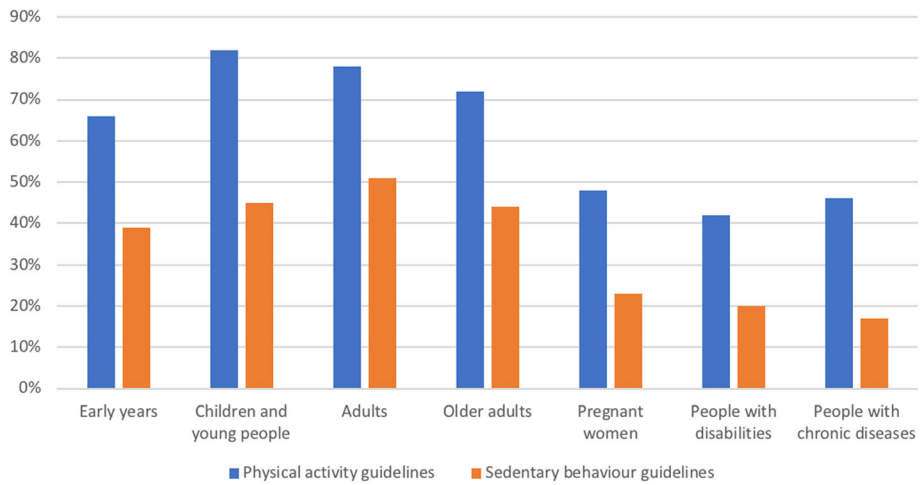

Fig. 3 Percentage of countries with specific national PA and SB guidelines for different target groups. PA: physical activity, SB: sedentary behaviour

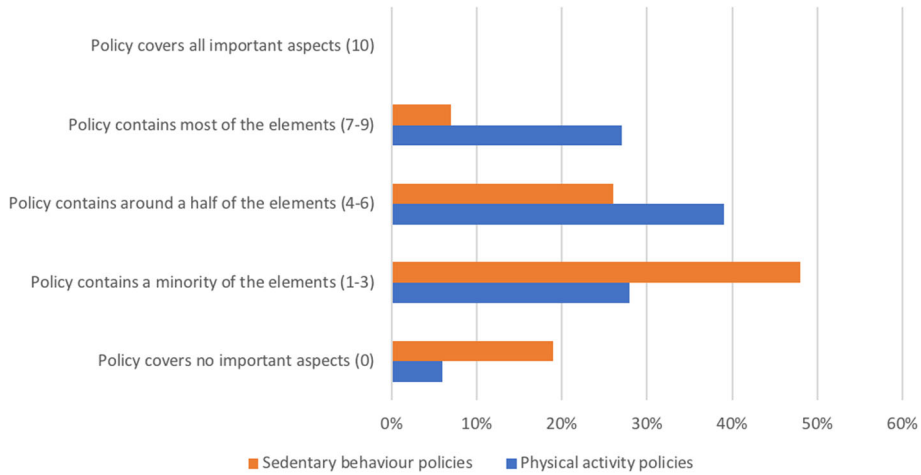

Fig. 4 Distribution of national PA and SB policies according to their level of comprehensiveness. PA: physical activity, SB: sedentary behaviour

elements. No countries reported having SB policy that includes all important elements. The median score for the comprehensiveness of SB policy was 2 (95% CI: 2, 3).

The level of comprehensiveness of PA and SB policies across countries with different income levels and world regions is presented in Table 1. We found significant differences in the comprehensiveness of PA policy between country groups by income level ($p = 0.030$) and between world regions ($p = 0.049$). We did not find significant differences in the comprehensiveness of SB policy by income level ($p = 0.157$) or by world region ($p = 0.412$). The level of comprehensiveness of PA and SB policies across different income levels and world regions is presented in Table 1.

Implementation of PA and SB policies

The level of implementation was assessed for a total of 150 national PA and SB policies. The percentage of PA and SB policies according to their level of implementation is presented in Fig. 5. For 39% (95% CI: 27, 52) of policies, we found that only around a half of the statements were implemented, while for 28% (95% CI: 17, 39) of policies most statements were implemented. A low level of implementation was found for 18% (95% CI: 8, 28), while 10% (95% CI: 2, 17) of policies were not implemented at all. Only a few policies (5%; 95% CI: 0, 10) were fully implemented. The median score for PA and SB policy implementation was 6 (95% CI: 5, 6).

The level of implementation of PA and SB policies across countries with different income levels and world

Table 1 Level of comprehensiveness of national PA and SB policies, by income level and world region

Category	Physical activity policy			Sedentary behaviour policy		
	Median (IQR)	95% CI	*p*	Median (IQR)	95% CI	*p*
Income						
High	5 (3)	4, 7	0.030	2 (3.5)	1, 3.5	0.157
Upper-middle	4 (3)	3, 5		2.5 (3.25)	2, 4.5	
Low and lower-middle	2 (3.25)	1, 4		2 (2)	1, 3	
Region						
Africa	2.5 (3.75)	1, 5	0.049	2 (2)	1, 3	0.412
Americas	4 (3.75)	2, 5		2 (3.5)	1, 4	
Eastern Mediterranean	3 (5)	0, 5		1 (3.5)	0, 3.6	
Europe	5 (3)	4, 7		3 (3)	1, 4	
South-East Asia	6.5 (4.75)	2.7, 10		6 (4)	n/a	
Western Pacific	6 (5)	1, 8		2.5 (4.25)	0.2, 4.8	
All countries	4 (4)	4, 5	/	2 (3)	2, 3	/

PA Physical activity, *SB* Sedentary behaviour, *IQR* Interquartile range, *CI* Confidence interval for median, *p* *p*-value for the difference between groups from Kruskal-Wallis test, *n/a* number of countries too small to calculate CI

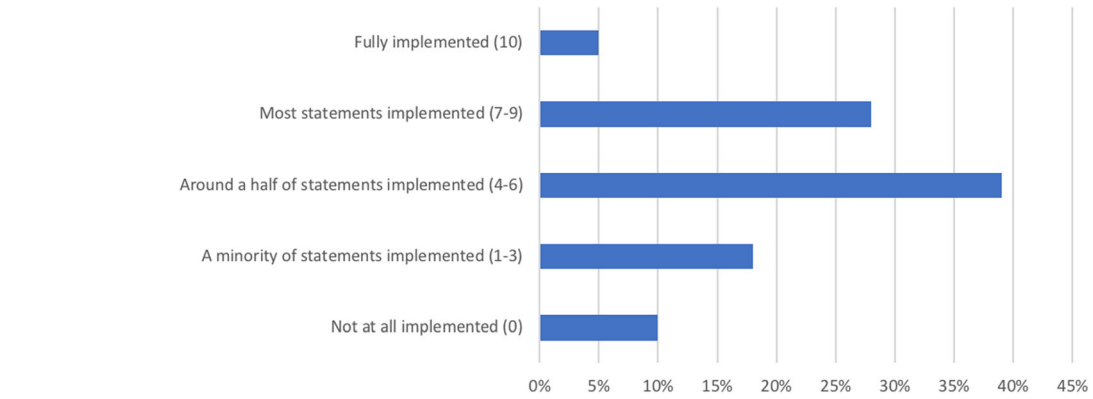

Fig. 5 Distribution of PA and SB policies according to their level of implementation. PA: physical activity, SB: sedentary behaviour

regions is presented in Table 2. We did not find a significant difference between the level of PA and SB policy implementation by income level ($p = 0.059$) or by world region ($p = 0.166$).

Effectiveness of PA and SB policies

The distribution of national PA and SB policies according to their level of effectiveness is presented in Fig. 6. We found that PA policy in 16% (95% CI: 7, 26) of countries was highly effective (i.e. most targets have been met), while in 38% (95% CI: 25, 51) of countries PA policy was moderately effective (i.e. around half of the targets have been met). A low level of effectiveness (i.e. a minority of targets have been met) was found for PA policy in 38% (95% CI: 25, 51) of countries, while in 7% (95% CI: 0.4, 14) of countries PA policy was not effective at all (i.e. no targets have been met). No countries reported having PA policy that was fully effective (i.e. all targets have been met). The median score for the effectiveness of PA policy was 4 (95% CI: 3, 5).

We found that SB policy in 10% (95% CI: 0.7, 19) of countries was highly effective (i.e. most targets have been met), while in 29% (95% CI: 15, 43) of countries SB policy was moderately effective (i.e. around half of the targets have been met). A low level of effectiveness (i.e. a minority of targets have been met) was found for SB policy in 49% (95% CI: 34, 64) of countries, while in 12% (95% CI: 2, 22) of countries SB policy was not effective at all (i.e. no targets have been met). No countries reported having SB policy that was fully effective (i.e. all targets have been met). The median score for the effectiveness of SB policy was 3 (95% CI: 2, 4).

The level of effectiveness of PA and SB policies across countries with different income levels and world regions is presented in Table 3. We found significant differences in the effectiveness of PA policy by income level ($p = 0.004$). We did not find significant differences in the effectiveness of PA policy by world regions ($p = 0.175$). We also did not find significant differences in the effectiveness of SB policy by income level ($p = 0.202$) or by world region ($p = 0.265$).

Table 2 Level of implementation of PA and SB policies, by income level and world region

Category	Median (IQR)	95% CI	*p*
Income			
High	6 (3)	5, 7	0.059
Upper-middle	6 (4)	3, 7	
Low and lower-middle	4 (5)	0, 5	
Region			
Africa	5 (6)	0, 6	0.166
Americas	6 (4.5)	3, 7.5	
Eastern Mediterranean	2 (6)	0, 6.2	
Europe	6 (2.75)	5, 7	
South-East Asia	6 (2)	n/a	
Western Pacific	6 (4)	3, 9	
All countries	6 (4)	5, 6	/

PA Physical activity, *SB* Sedentary behaviour, *IQR* Interquartile range, *CI* Confidence interval for median, *p* *p*-value for the difference between groups from Kruskal-Wallis test, *n/a* number of countries too small to calculate CI

Discussion

In this international study conducted in 76 countries, we found that most of the included countries have formal written PA policies, guidelines for PA, health surveillance or monitoring systems that include measures of PA, and quantifiable national targets for PA. However, the levels of comprehensiveness, implementation and effectiveness of PA policies were generally found to be low-to-moderate. Compared with PA policies, national SB policies were generally less available and comprehensive. They were also less implemented and effective. PA and SB policies were generally more developed in high-income countries and countries of European and Western-Pacific regions.

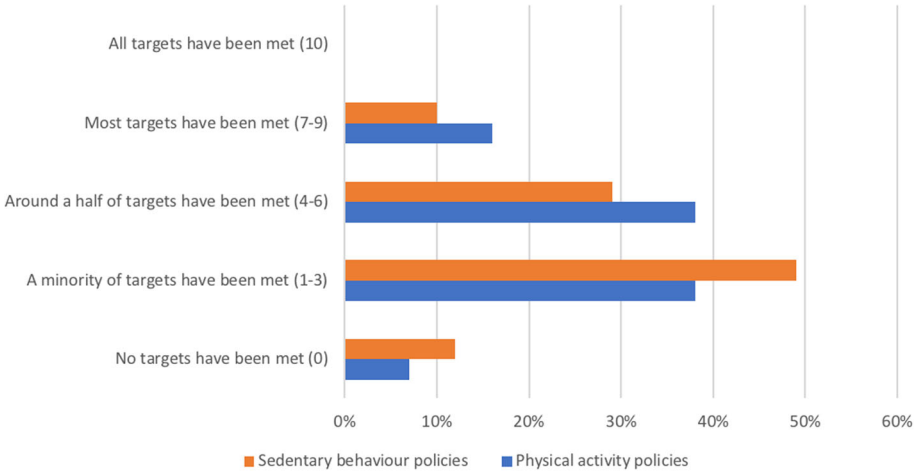

Fig. 6 Distribution of PA and SB policies according to their level of effectiveness. PA: physical activity, SB: sedentary behaviour

Availability of PA and SB policies

Formal written PA and SB policies

We found that formal written PA policies are available in most of the included countries, which is consistent with findings of previous studies [27, 28]. This is significant progress from the mid 2000s, when only around 29% of countries had PA policies [27]. However, our findings showed significant differences in the availability of national PA policies between country groups by income level and by world regions. The prevalence of insufficient physical activity is higher in high-income countries than in middle-income and low-income countries [29], which may partly explain why the governments in high-income countries are more likely to prioritise investing in the development of PA policies. Furthermore, in many low- and middle-income countries there is still a lack of country and context specific research on PA and health [30], which could be the reason for lower interest of policymakers to support the promotion of PA.

Low availability of formal written PA policies and PA guidelines may be especially problematic for the Eastern Mediterranean region. In addition to a high prevalence of noncommunicable diseases [31], this region has one of the highest physical inactivity and obesity rates in the world [32]. The call to focus more on developing national PA policies and implementation plans in the Eastern Mediterranean region from several years ago [33], is still justified.

The availability of SB policies was generally lower than the availability of PA policies. This finding is not surprising because public awareness of the potential adverse health outcomes of SB started to be systematically

Table 3 Level of effectiveness of PA and SB policies, by income level and world region

Category	Physical activity policy			Sedentary behaviour policy		
	Median (IQR)	95% CI	*p*	Median (IQR)	95% CI	*p*
Income						
High	5 (3)	3, 5	0.004	3.5 (2.75)	3, 5	0.202
Upper-middle	5 (3)	3.5, 6		3 (3.25)	2, 5	
Low and lower-middle	3 (3.5)	0.5, 4		2 (3)	0, 3	
Region						
Africa	2 (4.25)	1, 6	0.175	2 (3)	1, 4	0.265
Americas	4 (3)	2, 5		3 (3)	1, 4	
Eastern Mediterranean	3 (3.5)	0.4, 5.6		2 (2)	n/a	
Europe	5 (4)	4, 6		5 (3)	3, 5	
South-East Asia	5 (2)	n/a		5 (2)	n/a	
Western Pacific	3 (4)	0, 6.2		3 (2)	n/a	
All countries	4 (2)	3, 5	/	3 (3.5)	2, 4	/

PA Physical activity, *SB* Sedentary behaviour, *IQR* Interquartile range, *CI* Confidence interval for median, *p* *p*-value for the difference between groups from Kruskal-Wallis test, *n/a* number of countries too small to calculate CI

addressed no more than 20 years ago [6, 21]. Most evidence on SB policies and other determinants of SB comes from research conducted in high-income countries [6, 34]. Due to differences in socio-cultural, political, environmental, and legal factors, there is a need for context-specific research on SB policies [34]. More research on SB and associated policies is warranted, because such research may facilitate the development of national SB policies.

PA and SB guidelines

Availability of national PA guidelines is a good indicator of national PA and SB policy, as it shows the government's intention to support the promotion of more PA and less SB. More effort needs to be put in the development of national SB guidelines, as they were less represented than PA guidelines. The low availability of SB guidelines might be because there is still an ongoing discussion within the research community on whether there is sufficient epidemiological evidence on the dose-response relationship between SB and health outcomes [35, 36]. Furthermore, we found that the difference between high-income and low- and lower-middle-income countries is particularly large in the availability of PA and SB guidelines. The fact that a large majority of low- and lower-middle-income countries do not have national PA and SB guidelines is concerning from a public health perspective. Greater investment is needed in the development or adoption of PA and SB guidelines in low- and lower-middle-income countries, to support their promotion of more PA and less SB in the population.

Most of the included countries have specific PA guidelines for early years, children and young people, adults, and older adults, in accordance with the target groups in the WHO PA recommendations [37, 38]. We found that national guidelines for other, specific target groups were much less represented. The guiding principle for the implementation of the *Global Action Plan on Physical Activity 2018–2030* is proportional universality, which states that greatest efforts should be directed towards target populations that are the least active [17]. Countries should consider adopting the proportional universality principle in the development and implementation of their national PA guidelines. In accordance with this principle, specific PA and SB guidelines should be developed for pregnant women, people with disabilities, and people with chronic disease, as these population groups tend to be less active and more sedentary than the rest of the population [39–41]. These will likely feature in the updated WHO guidelines, which might facilitate their adoption in countries [42]. It should be acknowledged that the development of specific recommendations for people with disabilities and chronic diseases may be challenging, due to a large variety of different disabilities and diseases and the fact that the guidelines may need to be disability/disease-specific. The research base supporting the development of specific recommendations for people with disabilities and chronic diseases is also less well developed.

National targets for PA and SB

Health policy experts agree that for successful national PA and SB policies it is essential to set quantifiable, comparable national targets [22, 43–45]. However, we found that such targets for PA are still not available in nearly half of countries, while only a few countries have such targets for SB. The WHO's "global" target of "a 15% relative reduction in the global prevalence of physical inactivity in adults and in adolescents by 2030" can only be achieved through the joint effort of all countries contributing to this common goal [17]. This target could be used as a basis for setting a national target for PA in a country that still does not have one, but it should be adapted to the country-specific context. Setting quantifiable targets for SB may be more challenging, because evidence on prevalence of SB and its trends is less developed.

National PA and SB surveillance/monitoring

Health surveillance and monitoring have a key role in assessing the progress towards meeting PA and SB targets [46, 47]. There are still a large number of countries that do not have PA surveillance, particularly in the Eastern Mediterranean region. We also found that national surveillance of SB is less common than PA surveillance. This suggests that many national governments are still not committed to systematically tracking PA and SB in the population, which means that they may not be able to assess their progress in relation to the WHO targets for 2030.

Previous studies have suggested that comprehensive PA and SB surveillance systems are needed to provide a good evidence base for public health interventions and strategies [46, 47]. Our study provided data only on availability of national PA and SB surveillance. Future studies should explore the comprehensiveness of PA and SB surveillance systems, and how they conform to the principles of optimal PA and SB surveillance [47].

Ministries/departments involved in the promotion of more PA and less SB

An approach that integrates policies across settings and sectors is crucial for successful PA promotion at the national level [21, 44, 48–51]. We found that in most of the included countries ministries/departments in several sectors are, at least notionally, involved in the promotion of more PA and less SB, which suggests that, in this regard, national approaches to PA and SB policy are

heading in the right direction. A PA policy audit conducted in several European countries suggested that the sport, health, and education sectors were key drivers of PA policy, and that more opportunities for PA promotion should be created in other sectors [14]. In addition to the ministries/departments of sport, health, and education, in most of the included countries we also found that ministries/departments of recreation and leisure, research, transport, and urban/rural planning and design are engaged in the promotion of more PA and less SB. Despite these encouraging findings, facilitating engagement of ministries/departments across different sectors in PA promotion remains an important task for national governments. There is still ample space for improvement, particularly in the tourism, culture, environment, work and employment, and public finance sectors. Ideally, whole-of-system [17] and structural approaches [52] would be applied, to engage all relevant sectors and utilise knowledge from public health and social sciences. As outlined in the *Global Action Plan on Physical Activity 2018–2030*, a whole-of-system approach may be necessary to enable adequate policy investments in PA [17].

Comprehensiveness of PA and SB policies

Comprehensiveness is often regarded as a key determinant of successful policies on PA [49, 51, 53, 54]. Our findings suggest that in most of the included countries PA and SB policies are still not sufficiently comprehensive.

In 2013, a review of PA-related policies advocated for an urgent response to the noncommunicable disease burden in low- and middle-income countries by developing comprehensive policies to increase PA [55]. The results of our study show that the level of comprehensiveness of PA policies is higher in countries with higher income level. In our sample, the level of comprehensiveness of PA policies was the lowest in the African and Eastern Mediterranean regions. It may be challenging to develop all necessary components of PA and SB policy within the available budget, particularly in low- and lower-middle-income countries, where government's spending on the prevention of non-communicable diseases is generally low, and where the prevention of infectious diseases is a competing priority [56, 57]. Limited funding should therefore be carefully distributed, to cover all the essential components of PA and SB policy. Low- and lower-middle-income countries and countries in the African and Eastern Mediterranean regions might benefit from greater support by international experts and organisations in the process of developing and refining their national PA and SB policies. Another option for some countries would be to consider implementing the WHO *Global Action Plan on Physical Activity 2018–2030* [17] and adapting their current PA policies accordingly. Governments, non-governmental organisations, academia, and other stakeholders involved in PA promotion are invited to align their efforts towards achieving the targets outlined in the plan [17].

Implementation of PA and SB policies

A recent study found that most countries implemented less than a half of the noncommunicable disease policies recommended by the WHO [58]. The study also found that the number of countries that adopted PA policies is relatively large, but that it dropped between 2015 and 2017. We found that in most of the included countries half or more of the statements from key national PA and SB policies have not been implemented. Policies can be effective only if they are implemented; hence national governments should invest in mechanisms that would ensure better implementation of their PA and SB policies.

Several previous studies from high-income countries reported a lack of: (i) PA policy implementation; (ii) monitoring/evaluation of policy implementation; and (iii) allocated resources for PA policy implementation [25, 44, 49, 59]. From our data, it seems that the situation in low- and lower-middle-income countries is even more challenging, probably because they have fewer available resources for implementation of PA and SB policies. Highly complex policy designs without clear, specific, feasible, timely, and budgeted, and trackable action/implementation plans may be a recipe for failure of policy implementation [60, 61]. Therefore, national governments should rely on evidence from implementation science and aim to establish more efficient systems for implementation of PA and SB policies. National governments should also invest in rigorous evaluation of different types of interventions, sharing lessons learnt, and scaling-up the successful ones [62]. For some national governments, especially in low and lower-middle-income countries, PA promotion may not be a priority at the national level, so developing and piloting smaller-scale interventions at the local level could be a way to start building context-specific evidence.

Effectiveness of PA and SB policies

Effective PA and SB policies are necessary to increase PA and reduce SB in the population. Previous studies reported a lack of evidence on the effectiveness of PA policy [25, 63]. Our findings indicate that the effectiveness of national PA and SB policies in most of the included countries is low to moderate. Timely modification of PA and SB policies is of utmost importance, if they prove to be ineffective. Although this may be a challenging task, countries should invest in establishing efficient and sustainable systems to evaluate national PA and SB policies, and use the gathered data to continuously improve the effectiveness of the policies.

Strengths and limitations of the study

Strengths of this study include: (i) a large sample of countries from all world regions; (ii) separate analyses of PA and SB policies; and (iii) analyses of availability, comprehensiveness, implementation, and effectiveness of the policies.

This study was also subject to some limitations. First, not all the elements of a comprehensive analysis of PA and SB policy could be asked about, because we did not want to overburden our Country Contacts. For the same reason, we could not collect detailed data on all of the analysed policy elements. Second, the way policies are designed and implemented may vary depending on the political system, culture, and institutional settings in a given country [64]. Despite detailed explanations that we provided in our survey, it might be that some questions were not equally applicable to all country contexts. Third, the data were provided by GoPA! Country Contacts. It may be that some of them did not have access to all relevant data on PA and SB policies in their countries. Fourth, not all invited Country Contacts responded to the survey, which may have led to selection bias and reduced generalisability of the results. Finally, in the African and South-East Asian regions we had relatively small sample sizes, compared with other regions. This was mainly due to a lack of internationally visible PA and public health experts in some countries who we could recruit as Country Contacts.

Conclusion

This study found that most of the included countries have formal written PA policies, guidelines for PA, quantifiable national targets for PA, and a health surveillance or monitoring system that includes measures of PA. However, the levels of comprehensiveness, implementation and effectiveness of these policies are generally low-to-moderate. Compared with PA policies, national SB policies are less available, comprehensive, implemented, and effective. Both PA and SB policies are more developed in high-income countries, compared with low- and lower-middle-income countries, and in countries of the European and Western-Pacific regions, compared with other world regions.

Future studies should aim to include more countries from the African and Eastern Mediterranean regions, and analyse elements of a comprehensive analysis of PA and SB policy [21] that were not covered in this study, such as country-specific policy contexts, political will, unwritten formal statements, and informal policies. The area would also benefit from a detailed analysis of all stages of the policy cycle and policies in specific sectors.

To conclude, the findings of this study indicate that more investment is needed in the development and implementation of comprehensive and effective PA and SB policies, particularly in low- and lower-middle-income countries.

Supplementary information

Supplementary information accompanies this paper at https://doi.org/10.1186/s12966-020-01022-6.

Additional file 1 *GoPA! Policy Inventory, version 3.0*

Additional file 2. Percentage of countries with targets for PA and SB, by income level and world regions.

Additional file 3. Percentage of countries conducting PA and SB surveillance/monitoring, by income level and world region.

Additional file 4. Percentage of national ministries or departments involved in promotion of more PA and/or less SB.

Abbreviations

CAPPA: Comprehensive Analysis of Policy on Physical Activity; CI: Confidence Intervals; GoPA!: Global Observatory for Physical Activity; PA: Physical activity; SB: Sedentary behaviour; WHO: World Health Organization

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Authors' contributions

BKP, ZP, ARV, and MP conceived the idea for the study. BKP, ARV, and ZP contacted Country Contacts for data collection. BKP conducted data analysis. ZP provided support in conducting data analysis. BKP drafted the initial manuscript. ZP, ARV, MP, KM, AB, and SJHB contributed to writing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

Summary results are available in Figures, Tables and Additional files. Raw data can be obtained from the corresponding author upon a reasonable request.

Ethics approval and consent to participate

The ethics approval was obtained from the Victoria University Human Research Ethics Committee (ref: HRE19–057). Participation in the study was voluntary, and all participants provided informed consent before responding to survey questions.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Publisher's Note

Appendix B: Additional files complementing *A global systematic scoping review of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies* (Chapter 4)

Appendix B1: Additional file 1: Full search syntaxes used for each database

Scopus:

title-abs-key("physical activity" or "physical inactivity" or sedentar* or sitting) and title-abs-key(policy or policies)

PubMed/MEDLINE:

("physical activity"[tw] OR "physical inactivity"[tw] OR sedentar*[tw] OR sitting[tw]) AND (policy[tw] OR policies[tw])

Web of Science, SportDiscus (through EBSCOhost) Open Access Theses and Dissertations (OATD), Networked Digital Library of Theses and Dissertations (NDLTD):

("physical activity" or "physical inactivity" or sedentar* or sitting) and (policy or policies)

Appendix B2: Additional file 2: Description of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies

Study	Scope	Focus	Period	Short description and methods
Adeniyi et al., 2016 [59]	National (1 country)	A wide range of PA indicators for children and youth in Nigeria	2013 – 2016	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing academic and grey literature (e.g. government documents and dissertations). It includes an assessment of *Government, Nongovernmental Organizations, and Private Sector (Strategies and Investments)/Policy* as one of ten PA indicators.
Aguilar-Farias et al., 2016 [60]	National (1 country)	A wide range of PA indicators for children and youth in Chile	n/a	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group that reviewed available evidence from government documents, publications, surveys, and data sets. It includes an assessment of *Government Strategies and Investments* as one of 11 PA indicators.
AHK Canada, 2016 [58] Barnes et al., 2016 [71]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* and the associated journal article were created by the Healthy Active Living and Obesity research group and a RC research committee. Assessed sources included peer-reviewed literature, national surveys, and grey literature (e.g. online content and government and nongovernment reports). The RC includes an assessment of PA *Strategies and Investments (Government)* as one of 12 PA indicators.
AHK Canada, 2015 [57]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by the Children's Hospital of Eastern Ontario research institute and a RC research committee. They synthesised data from the research literature and multiple data sources, mainly surveys. The RC includes an assessment of PA *Strategies & Investments (Government)* as one of 11 PA indicators.
AHK Canada, 2014 [56] Gray et al., 2014 [111]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* and the associated journal article were created by the Healthy Active Living and Obesity research group and a RC research committee. RC development process includes an expert consensus and synthesis of the best available research, policy, surveillance, and practice findings. It includes an assessment of PA *Government Strategies and Investments* as one of ten PA indicators.
AHK Canada, 2013 [55]	National (1 country)	A wide range of PA indicators for children	best available current evidence	This *RC on PA for Children and Youth* was created by the Children's Hospital of Eastern Ontario research institute and a research work group. RC synthesises data from the research literature and multiple data sources, mainly surveys. It includes an assessment of PA

		and youth in Canada		*Strategies and Investments* / *Policy - Federal Government Strategies and Investments* as one of 17 PA indicators.
AHK Canada, 2012 [54] Barnes et al., 2013 [72]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* and the associated journal article were created by the Healthy Active Living and Obesity research group and a research work group consisting of 11 experts. Healthy Active Living and Obesity research group conducted a review of non-academic and academic literature. The research work group reviewed content and assigned grades for 24 PA indicators. The RC includes an assessment of *Federal Government Strategies* and *Federal Government Investments* as two indicators that belong to the *Policy* category.
AHK Canada, 2011 [53]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by the Children's Hospital of Eastern Ontario research institute and a research work group that synthesised and reviewed data from the research literature and multiple data sources. It includes an assessment of *Federal Government Strategies* and *Federal Government Investments* as two out of 23 PA indicators that belong to the *Policy* category.
AHK Canada, 2010 [52]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by a research group that synthesised and reviewed data from the various data sources such as studies, surveys, literature and policy reviews. It includes an assessment of *Federal Government Strategies* and *Federal Government Investments* as two out of 17 PA indicators that belong to the *Policy* category. Historical review of policies and summary of eight criteria required for effective policy implementation and development informed the assessment of these indicators.
AHK Canada, 2009 [51]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by a research group that assessed several information sources including national data sets, industry reports, peer-reviewed research publications, and various media sources. It includes an assessment of *Federal Government Strategies* and *Investments* as one of 19 PA indicators.
AHK Canada, 2008 [50]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by the AHK Canada staff and a research work group that identified, ranked and graded 23 PA indicators, based on available research, data and key issue areas. Consultations with key stakeholders who provided feedback also informed the development of the RC. It includes an assessment of *Progress and Government Strategies and Investments* as one of the indicators that belongs to the *Policy* category.
AHK Canada, 2007 [49]	National (1 country)	A wide range of PA indicators	best available current	This *RC on PA for Children and Youth* was created by a research work group that identified, ranked and graded 13 PA indicators, based on available research, data and key

		for children and youth in Canada	evidence	issue areas. Consultations with key stakeholders who provided feedback also informed the development of the RC. The RC includes an assessment of *Progress on Government Strategies and Investments* as one of the indicators that belongs to the *Policy* category.
AHK Canada, 2006 [48]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	This *RC on PA for Children and Youth* was created by a research work group that reviewed the results from the RC published in 2005. It served as starting point for data collection, analysis and establishment of 14 PA indicators. It includes an assessment of *Federal Strategies and Investments* as one of the indicators. The indicator belongs to the *Policy* category that assessed government policy support for PA.
AHK Canada, 2005 [47]	National (1 country)	A wide range of PA indicators for children and youth in Canada	best available current evidence	Canadian national PA Symposium engaged leading experts in PA research and was a starting point for creation of this *RC on PA for Children and Youth*. RC is based upon analyses of information obtained from multiple cycles of the several surveys, and various research studies and data grouped in the six category areas. It includes an assessment of *Federal Strategies and Investments* as one of 14 PA indicators. The indicator belongs to the *Policy* category.
Akinoroye et al., 2014 [61]	National (1 country)	A wide range of PA indicators for children and youth in Nigeria	n/a	This *RC on PA for Children and Youth* was created by a technical report committee that identified and reviewed relevant published and unpublished literature. It includes an assessment of *Government Strategies and Investments* as one of 14 PA indicators.
Al-Bahlani & Marby, 2014 [62]	National (1 country)	Legislation for NCD prevention in Oman	n/a	The study provides an overview of documents related to NCD prevention. A search of documents in Arabic and English was conducted using Internet search engines and through various websites of relevant institutions (e.g. Gulf Cooperation Council, ministries of legal affairs, ministries of health etc.). The review also included the strategies and reports provided by the Ministry of Health and public health professionals.
Al-Kuwari et al., 2016 [63, 64]	National (1 country)	A wide range of PA indicators for children and youth in Qatar	2004 – 2014	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group that identified and reviewed relevant published and unpublished literature. The work group discussed the obtained information with a stakeholder group that provided additional data. The RC includes an assessment of *National Policy*, *Strategy, and Investment* as one of nine PA indicators.
Alderman et al., 2007 [65]	National (1 country)	Laws to combat obesity in the USA	n/a	The study explores the history of public health legislation and how law interacts with public health aspects of children's healthy nutrition and PA in the USA. Study outlines the complex interaction of policy makers, advocates, judiciary and legal doctrines, and the food

				industry with regard to obesity issues.
Aman, 2005 [66]	International (2 countries)	Development of leisure policies in New Zealand and Malaysia	1970 - 2020	This doctoral dissertation is a comparative analysis of leisure policies in New Zealand and Malaysia. Data was obtained through archival, library research of publicly available documents and through semi-structured interviews with 21 “key players” from each country.
Amornsriwatanakul et al., 2016 [67, 68]	National (1 country)	A wide range of PA indicators for children and youth in Thailand	Survey data collection: June 2015 – January 2016	This *RC on PA for Children and Youth* and the associated journal article were created by a national committee comprising experts from key stakeholders. It includes *Government Strategies, Policies, and Investments* as one of nine PA indicators. Government published and unpublished reports were reviewed to inform this indicator. Committee members from government authorities provided additional input for this indicator. Other indicators were mainly informed by a survey that was conducted as a part of this RC.
Ballesteros Arribas et al., 2007 [70] (in Spanish language)	National (1 country)	A nutrition, PA and obesity strategy in Spain	n/a	The study provides a description of the content and development of a policy document; the *Spanish strategy for nutrition, physical activity and the prevention of obesity* (NAOS Strategy), issued in 2005.
Bell-Altenstad & Vail, 1995 [73]	National (1 country)	Sport policy in Canada	n/a	The study is a policy discourse analysis of Federal Government of Canada’s sport policy development in regard to women.
Bellew in Bull et al., 2004 [74]	National (1 country)	Documents to inform National Strategy for PA in Australia	Documents from 1999 till 2003	The study is a review of 22 framework/strategy documents related to PA, conducted to inform the development of the National Strategy for PA. It includes both federal- and state/territory-level government and non-government documents.
Bellew et al., 2011 [8]	International	Policy actions for PA promotion	2009 – 2010	The article describes national and local public policy actions and programmes for PA promotion in Australia, Brazil, Canada, Europe, Great Britain, Nordic countries, Switzerland, and the USA.
Bellew et al., 2008 [6]	National (1 country)	Australian PA policy	1996 – 2006	The study is a comparison of Australian policy with international PA policies in seven countries assessed using the proposed HARDWIRED policy definition criteria. Literature and policy reviews were combined with questionnaires sent to purposively sampled experts. The historical development including key PA policy events in Australia is also presented in the paper.
Bercovitz, 1998 [75]	National (1 country)	Active living policy in Canada	n/a	The study includes a critical analysis of Canada’s Active Living policy and an overview of its evolution.

Bergsgard et al., 2007 [76]	International (4 countries)	Sport policy (including "Sport for All")	n/a	The book includes a comparative study of sport policies in four countries – Canada, England, Germany, and Norway. Document analysis, qualitative content analysis, and interviews with senior policy actors and academic observers in the area of sport policy were conducted. Historical and political contexts are also presented.
Bornstein et al., 2014 [78]	National (1 country)	National PA plan in the USA	n/a	The study comprehensively describes the full development process of the document titled *National Physical Activity Plan for the United States*, to inform further development of community and state-based PA plans within the USA and national PA plans in other countries.
Bornstein & Pate, 2014 [77]	National (1 country)	National PA plan in the USA	n/a	The study describes the development process and the content of the document titled *U.S. National Physical Activity Plan*. It also reflects on the current status of and future perspectives for the national plan.
Bornstein et al., 2009 [79]	International (6 countries)	National PA plans	n/a	The study is a review of six comprehensive PA national plans published in English from Australia, Northern Ireland, United Kingdom, Sweden, Scotland and Norway. The documents were found in electronic databases. Their content, characteristics, and development processes were analysed to inform the development of the USA PA plan.
Branca et al., 2007 [80]	International (19 countries)	Obesity prevention in general	n/a	This book is about the obesity challenge in Europe. One of its chapters is related to *National policies in the European Region*. Twenty-six national policy documents on PA, obesity and nutrition in English from 19 countries were analysed. Policies from 17 additional countries were briefly discussed at the end of the chapter, but were not thoroughly analysed.
Bravo & Silva, 2014 [81]	National (1 country)	Sport policy in Chile	n/a	The study includes an overview of the historical development and the current status of Chile's sport policy. It examines key legislative documents and their influence on sport.
Bréchat et al., 2009 [82] (in French language)	National (1 country)	National programmes for PA and sport in France	2001 - 2006	The study is a review of 14 national programmes/actions on PA and sports, conducted to assess the rationale used to develop a public health project in France. Data was collected using semi-structured interviews with 15 PA/sport experts who had experience in developing at least one PA/sport-related action plan or document that were obtained during interviews or through Internet search. The design, implementation, and evaluation of programmes were analysed.
Brown et al., 2011 [43]	International (2 countries)	Evidence on PA for older people and PA guidelines for older people in	Documents published since 2004 (chapter 9)	The study is an extensive literature review of evidence on PA and of the current PA guidelines for older people. In chapter nine titled *International guidelines, policies and principles*, various databases (e.g. the WHO database) and Internet sources (e.g. websites of ministries and governments) have been searched for documents published in English

		New Zealand, Australia and international findings		language. Two systematic reviews of policies, 22 national policy or strategy documents, and seven position stands/scientific statements from professional bodies were included in the review. The documents have been assessed using the Appraisal of Guidelines for Research and Evaluation quality grading.
Bull et al., 2014 [83-85]	International (7 countries)	HEPA policies	2009-2012 (data representative up to May 2011)	The study compared the development processes, content, and implementation of HEPA policies in seven EU countries (Finland, Italy, the Netherlands, Norway, Portugal, Slovenia, Switzerland). The data was collected using the HEPA PAT. For each country, a leading academic, a representative of relevant institute or (sub)national government official, was in charge for completion of the HEPA PAT. Directed content analysis was used to analyse collected data.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	International (7 countries + Finland)[5]	National PA policy	Policy documents from 1966 - onwards	The study is an analysis of the development and the content of PA policy in Australia, Brazil, Canada, the Netherlands, New Zealand, Switzerland, and Scotland assessed against 11 specific criteria for successful PA policy and action plans. The data on policy were extracted from articles, national policy documents, and grey literature obtained through an electronic literature search.
Burghard et al., 2016 [87, 88]	National (1 country)	A wide range of PA indicators for children and youth in the Netherlands	2010 – 2014	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group that synthetised the best available research, surveillance, policy and practice findings. The RC includes an assessment of *Government Strategies and Investments* as one of nine PA indicators. Multiple government documents informed this indicator.
Cavill et al., 2006 [89]	International (3 countries)	PA promotion and policy	n/a	The study provides guidelines for a systematic evidence-based approach to PA promotion. The approaches to policy development and promotion of PA in England, Finland, and Switzerland were explored and described.
Ceccarelli et al., 2011 [90]	International (34 countries)	Policy statements related to obesity, improvement of diet, and PA	documents adopted until 2008	The study is a review of quantitative and qualitative documents published in English, French, Italian, Spanish, and Portuguese. Information about policies and interventions was mostly gathered from sources such as national public health institutions, health ministries, and the WHO Regional Office for Europe nutrition policy database.
Chen in Simonopoulos (ed.), 1997 [91]	National (1 country)	Policies on nutrition, fitness and "Sport for All"	n/a	This conference paper presents an unsystematic overview related to of nutrition, physical fitness, and "Sport for All" in China. One part of the paper is dedicated to the *Sports for All* plan.

[5] Findings for Finland were presented only in Schöppe et al., 2004.

Chimeddamba et al., 2015 [92]	National (1 country)	Policy documents for NCD prevention in Mongolia	Documents from 2000 – 2013	The study analysed 45 policy documents related to NCD prevention issued by the Mongolian Government. Documents were obtained through an Internet-based search including the websites of the Government, United Nations agencies, NGOs, research institutes, and by using Medline and Google Scholar. The literature review was complemented by expert consultations.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	International (15 EU member states)	Policies related to sport and HEPA	2000 - 2009	The study used policy content analysis of EU member states' national (and subnational if no national available) policy documents related to HEPA and sport. Documents were obtained by: search of International inventory of documents on PA promotion; Internet search of websites of relevant ministries; Google search by key words; country templates completed by National Information Focal Points. A content analysis of policies was performed on 25 documents. Study is a part of "Promoting networking, exchange and greater synergy between sport and health-enhancing physical activity sectors" (NET-SPORT-HEALTH) project.
Clarke & Ojo, 2017 [93]	National (1 country)	Sport policy in Cameroon	n/a	The study presents an overview of the historical development and current status of the sport policy in Cameroon. It examines, for example, the recent political past, organisation of sport, physical education, importance of football, and "non-state-led" sport.
Coenen et al., 2017 [38]	International (9 countries)	SB policies	1989 – 2015	The study reviewed health and occupational safety policies relevant to occupational SB. A qualitative synthesis of 119 policy documents written in English or Dutch was performed. The study included documents from: Australia, Canada, Denmark, Finland, the Netherlands, New Zealand, Sweden, the United Kingdom, the USA; international organisations; and pan-European occupational health and safety or related agencies. Triangulation of data was provided by key informant participants of focus groups.
Costa Januario et al., 2012 [94] (in Portuguese language)	National (1 country)	PA and sport in government programmes in Portugal	1987 - 2011	The study is a descriptive analysis. It is a legal interpretation of PA and sport promotion and support mentioned in the Portuguese Governments' documents (*Programa do Governo Consituctional*). It provided assessment of 14 programmes/agendas published in each government term.
Craig, 2011 [95]	National (1 country)	PA policy in Canada	1981 – 2011	The study analyses the evolution of PA policy in Canada. Historical and current policy documents at federal, territorial and provincial were found through literature review, a search of non-government and government websites, and by contacting government officials responsible for PA. Content, barriers, results, and success factors of the policy were analysed.

da Silva, 2007 [96] (in Portuguese language)	National (1 country)	PA and sport policies throughout history in Brazil	End of 19th century until 1950s	The study analyses the role that PA/sport and PA/sport policy played in strengthening the Brazilian national identity and, consequently, in legitimising some of the Government actions. It is an in-depth historical narrative analysis of Government policy and policy documents related to PA and sport.
Daugbjerg et al, 2009 [11]	International (14 countries)	Policy documents related to PA promotion	Only the most recent documents included	The study is a content analysis of 27 policy documents from 14 countries in the European Region. It included national PA policy documents published in English. Documents were obtained from websites of the relevant ministries and health promotion agencies, subnational initiatives, and other relevant PA promotion projects and through a Google search. Results of the search were complemented by the relevant materials and findings from questionnaire data previously collected by the WHO. An overview of 49 policy documents on PA promotion from 24 countries is also presented, but only 27 documents were included in the content analysis.
de Villiers et al., 2010 [97]	National (1 country)	A wide range of PA indicators for children and youth in South Africa	2004 – 2010	This *RC on PA, Nutrition and Tobacco use for Children and Youth* was created by a scientific advisory panel that assessed: peer-reviewed published manuscripts; dissertations and theses; government-funded reports; and monographs. It includes an assessment of *Policies, programmes and interventions to promote physical activity* as one of PA indicators.
Dentro et al., 2014 [98, 99]	National (1 country)	A wide range of PA indicators for children and youth in USA	2003 – 2014 (data sources published)	This *RC on PA for Children and Youth* and the associated journal article were created by a research advisory committee that identified key publications and the best available data sources. It includes an assessment of *Government Strategies and Investments* as one of ten PA indicators.
Draper et al., 2014 [100, 101]	National (1 country)	A wide range of PA indicators for children and youth in South Africa	2010 – 2014	This *RC on PA and Nutrition for Children and Youth* and the associated journal article were created by a research work group that conducted a systematic review of dissertations, peer-reviewed literature, and grey literature. It includes an assessment of *Influence of Government,* that is, *Government – Strategies, Policies, Investments* as one of ten PA indicators.
Egger et al., 2001 [102]	National (1 country)	National PA Guidelines in Australia	n/a	The article describes the development process of the *National Physical Activity Guidelines for Australians*.
Eyler, 2011 [103]	National (1 country)	PA policy in the USA	n/a	The article described PA promotion through policy. It outlined PA policy research framework, theories related to PA policies, and promising PA policies in the USA.
Fullagar, 2003 [105]	National (1 country)	Health policy	n/a	The study developed a feminist analysis of the implications of the growing emphasis on active

		(Active Australia campaign)		leisure promotion among women as a "sedentary" population. It assessed universal healthy lifestyle norms and health-promotion rationalities behind the *Active Australia*'s intention to mobilise women to become more active.
Fullagar, 2002 [104]	National (1 country)	Leisure and lifestyle in Australian health policy	n/a	The study provides a cultural analysis of government campaigns *Life be it*! and *Active Australia*. It offers an assessment of the ways discourses of healthy lifestyle and leisure have been produced through Australian health policy objectives and promotion.
Galaviz et al., 2016 [106]	National (1 country)	A wide range of PA indicators for children and youth in Mexico	2013 - 2015 (most data from that period)	This *RC on PA for Children and Youth* was created by an expert work group that conducted a literature search to identify: peer-reviewed literature; national surveys; an online PA related content; and grey literature, including non-government and government reports. It includes an assessment of *Strategies and Investments (Government and Non-Government)* as one of nine PA indicators.
Gillon, 2010 [107]	International (2 countries)	Active recreation policy and human rights-based approach	n/a	This master thesis explores a human rights-based approach applied on active recreation policy in New Zealand. Literature review, document analysis, and interviews with four key informants were undertaken. Document analysis was conducted on key policy documents in the United Kingdom and New Zealand using a human rights approach and a discourse analysis.
Gomez, 2015 [108]	International (2 countries)	Obesity policy	n/a	This case study compared responses to obesity by Brazilian and USA federal institutions. Qualitative data used in this study were: government documents; peer reviewed journal articles; and reports published by think tanks. The article addressed PA policies as an important part of government approaches and responses to obesity.
González et al., 2016 [109]	National (1 country)	A wide range of PA indicators for children and youth in Colombia	2005 – 2015	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by conducting two systematic reviews to gather best published and nationally representative evidence. Policy documents, national surveys, and reports from government institutions were reviewed. The RC includes an assessment of *Government* as one of 14 PA indicators.
González et al., 2014 [110]	National (1 country)	A wide range of PA indicators for children and youth in Colombia	2005 – 2013	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing current policies, national surveys, and other unpublished and published data. It includes an assessment of *Policy* as one of 12 PA indicators.
Green, 2009 [112]	National (1 country)	Sport policy priorities	n/a	The study analyses priorities in sport policy in the United Kingdom (mainly England). The conceptual framework of the study was based

				on the literature on governance and "new public management".
Guo & Pan, 2016 [113] (in Chinese language)	National (1 country)	PA policies in the USA	1960 – 2014	The study used a text analysis to assess 40 USA PA policy documents. The authors searched through several databases and included formal and written government/non-government documents.
Halliday et al., 2013 [114]	National (1 country)	National PA Strategy in Scotland	n/a	This article reports on a review of the Scottish national PA strategy - *Let's Make Scotland More Active,* five years after its implementation.
Hämäläinen et al., 2016 [115]	International (6 countries)	HEPA policy-making	2012 – 2013 (interviews) 2001 – 2013 (documents)	The study explores cross-sector cooperation in HEPA policymaking in Denmark, England, Finland, Italy, the Netherlands, and Romania. Qualitative content analyses of 21 policies and of semi-structured interviews with 86 key policymakers were conducted. The study was a part of the project "REsearch into POlicy to enhance Physical Activity" (REPOPA 2011-2016).
Hämäläinen et al., 2016 [117]	International (4 countries)	Equality and equity in HEPA policies	2012 – 2013 (interviews) 2001 – 2013 (documents)	The study explores equality and equity in national and subnational PA promotion policies in Denmark[6], England, Finland, and Romania. Sixty-one interviews and 14 policies were analysed using a qualitative content analysis. The study was a part of the project "REsearch into POlicy to enhance Physical Activity" (REPOPA 2011-2016).
Hämäläinen et al., 2015 [116] Aro et al., 2016 [69]	International (6 countries)	Use of evidence in HEPA policies	2012 – 2013 (interviews) 2001 – 2013 (documents)	The study explored the use of evidence in national, regional, and local HEPA policies. Qualitative content analyses of 21 policies and of semi-structured interviews with 86 key policymakers were conducted. The study was a part of the project "REsearch into POlicy to enhance Physical Activity" REPOPA (2011-2016).
Harrington et al., 2016 [120, 121]	International (2 countries)	A wide range of PA indicators for children and youth in Northern Ireland and Republic of Ireland	2011 – 2015	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by evaluating academic articles and policy documents identified by online and database searches. It includes an assessment of *Government* as one of ten PA indicators.
Harrington et al., 2014 [118, 119]	International (2 countries)	A wide range of PA indicators for children	2003 – 2010	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing key data sources identified by online and database searches. It includes an assessment of *Government* as one of ten PA indicators.

[6] For Denmark, only subnational (local and regional) policies were analysed. Therefore, findings for Denmark are not presented in Additional file 3.

		and youth in Northern Ireland and Republic of Ireland		
Herrera-Cuenca et al. 2016 [122, 123]	National (1 country)	A wide range of PA indicators for children and youth in Venezuela	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing literature that included: peer reviewed articles; published national data reports; grey literature; national/local reports on PA; and public policy actions. It includes an assessment of *National Level Policies* as one of 13 PA indicators.
Huang et al., 2016 [124, 125]	National (1 country)	A wide range of PA indicators for children and youth in Hong Kong	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by searching three types of data sources: government reports; peer reviewed journal articles; and relevant national journals, and by collecting additional information through a manual search and personal contacts. It includes an assessment of *Government - Strategies, Policies, Investments* as one of nine PA indicators.
Jebb et al., 2013 [126]	National (1 country)	Obesity, actions and policy in England	Policies/actions 2003 – 2012	The article describes the actions taken and the most relevant information about the key strategy to tackle obesity in England and the impact of different obesity related policies. Summary and evaluation of the 28 national policy actions area presented.
Kahlmeier et al., 2015 [127]	International (37 countries)	PA recommendations	Until summer 2012 (only the most recent documents taken into account)	The study is an analysis and a systematic overview of national PA recommendations in European countries. It included documents in English, German, and French. Main information about the documents was obtained through a template completed by the WHO national information focal points. This was complemented by an online search. The study analysed whether national recommendations were in line with the WHO 2010 PA recommendations.
Kalman & Hamrik, 2013 [128] (in Czech language)	International (6 countries)	PA as public policy issue	Policies available in database from March to May 2010	The study is a content analysis of 25 national policy documents related to PA promotion in Finland, Great Britain, Ireland, the Netherlands, Norway, and Sweden. Only documents in English found through WHO's International Inventory of Documents on Physical Activity Promotion were included. Four hundred eleven text segments were coded. The study concluded that low PA levels are a public policy issue.
Kalman et al., 2008 [129]	National (1 country)	PA promotion	n/a	This is a conference paper about PA promotion. It reviewed the community recreation management system and

		in Czech Republic		interventions to increase PA. Twelve documents on national, subnational and supra-national level were included in the analysis.
Katapally et al., [130, 131]	National (1 country)	A wide range of PA indicators for children and youth in India	2004 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing: peer reviewed data sources; grey literature; and other nationally representative published and unpublished data. It includes an assessment of *Government - Strategies, Policies, and Investments* as one of ten indicators.
Katikireddi et al., 2011 [132]	National (1 country)	Analysis of the *Healthy Lives, Healthy People* white paper	n/a	The article evaluates Government's white paper *Healthy Lives, Healthy People*. It analyses whether English public health policy is evidence-based.
Katzmarzyk et al., 2016 [133, 134]	National (1 country)	A wide range of PA indicators for children and youth in USA	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a RC research advisory committee by reviewing key nationally-representative data sources, mainly surveys. It includes an assessment of *Government Strategies and Investments* as one of ten PA indicators.
Kobayashi et al, 2017 [135]	National (1 country)	Sport policy in Vanuatu	n/a	This article outlines the development of national sport policy in Vanuatu. It analyses government objectives and policies for sport and the extent and nature of sport programmes supported by the government.
Koh, 2010 [136] (in Korean language)	International (5 countries)	PA recommendations and guidelines	Mainly from 1990s	The study reviewed PA guidelines/recommendations for adults from Australia, Canada, England, Japan, and the USA to inform the development of Korean national PA guidelines. PA guidelines/recommendations were identified in publications that were previously known to the author and by conducting a literature search through PubMed, Medline, and Google Scholar.
Kranzler et al., 2013 [137]	National (1 country)	National Programme to Promote Active, Healthy Lifestyle	n/a	The study analysed the Israel's *National Programme to Promote Active, Healthy Lifestyle* and its compliance with the *Health in All Policies* strategy for health governance.
Kruusamäe et al., 2016 [138]	National (1 country)	A wide range of PA indicators for children and youth in Estonia	2008 – 2016	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing "original publications", key surveillance data, surveys, and database information. It includes an assessment of *Government - strategies, policies, and investments* as one of nine indicators.

Kudláček et al., 2012 [139] (in Czech language)	National (1 country)	National policies on infrastructure for leisure-time PA	n/a	The study assessed national, regional, and local level policies related to leisure-time PA. Thirteen structured qualitative interviews with policy makers and experts were conducted as well as focus groups with ten representatives of end users. Content analysis was performed on interviews, focus groups, and documents (legislations and regulations). The study was a part of project "Improving Leisure-time Physical Activity in the Local Arena" (IMPALA).
Lachat et al., 2013 [140]	International (83 countries)	Diet and PA policies – NCD prevention	1st January 2004 – 1st January 2013	This article is a systematic policy review. Structured content analysis of national health, NCDs, and nutrition policies for low- and middle-income countries was performed. Internet search of national ministries' websites and the WHO database was conducted. Data about PA policies were available for 35 countries.
Lagos et al., 2016 [141]	National (1 country)	*Choose to live healthy* programme	2010 – 2013 president's declaration	The study assessed *Choose to live healthy* programme in Chile using a discourse analysis. The analysis of 11 items included: national documents; legislation related to programme; four president's annual declarations to the Government; speech/presentation of the First Lady; national study *Healthy Chile*; and a leaflet published within the *Choose to live healthy* programme.
Larsen et al., 2016 [142] Larsen et al., 2017 [143]	National (1 country)	A wide range of PA indicators for children and youth in Denmark	2007 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by a RC research committee by reviewing the best available research and policy strategies. It includes an assessment of *Government Strategies and Investments* as one of nine PA indicators.
Liu et al., 2016 [144]	National (1 country)	A wide range of PA indicators for children and youth in Shanghai and China	Literature search in September 2014	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing literature in Chinese and English. It includes an assessment of *Government* as one of nine PA indicators. Surveys and Delphi method were used to inform some indicators.
Liukkonen et al., 2014 [145] Gråstén et al., 2014 [226]	National (1 country)	A wide range of PA indicators for children and youth in Finland	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group involving key experts and stakeholders. It includes an assessment of *Government – Strategies, Policies, Investments* as one of nine PA indicators. Five main data sources informed the indicator assessment process.
Lu & Henry, 2011 [146]	National (1 country)	Sport policy in China	1949 - 2008	The study is a historical review of sport policy development in China. The study is focused on rural areas.
Maddison et al., 2016 [149]	National (1 country)	A wide range of PA	2014 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by an expert panel that updated the 2014 RC. The

Maddison et al., 2015 [148]		indicators for children and youth in New Zealand		panel identified and reviewed available evidence and key data sources. Consultations with stakeholders were also undertaken. It includes an assessment of *Government Initiatives* as one of nine PA indicators.
Maddison et al., 2014 [147]	National (1 country)	A wide range of PA indicators for children and youth in New Zealand	2005 – 2013	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by an advisory group by mainly reviewing nationally-representative survey data. It includes an assessment of *Government Initiatives* as one of nine PA indicators.
Manyanga et al., 2016 [150, 151]	National (1 country)	A wide range of PA indicators for children and youth in Zimbabwe	2003 – 2015 (years of publication of included studies)	This *RC on PA for Children and Youth* and the associated journal article were created by a RC work group by reviewing the best available published or unpublished literature that includes, for example: policy documents; graduate student theses; and syllabi. The RC includes an assessment of *Government Strategies and Investments* as one of ten PA indicators.
Matalas in Simonopoulos (ed.), 1997 [152]	National (1 country)	Programmes/policies on nutrition, fitness and "Sport for All"	n/a	This is a conference paper that presents an overview of sports, nutrition, fitness, education, and "Sport for All" policies and programmes in Greece from the Classical period until mid-1990s.
Méndez, 2015 [153] (in Spanish language)	National (1 country)	PA policy in Mexico	n/a	The study analyses PA policy through several government documents, mainly focusing on *General Law on Physical Culture and Sports* and its related programme. Design, entry into agenda and force, implementation, and evaluation of the PA policy are discussed.
Milton & Bauman, 2015 [40]	National (1 country)	PA policy in England	n/a	The study is a critical analysis of national PA policy cycles in England. Literature search was performed to identify relevant past and present PA documents. Scientific literature search through the PubMed database and web-based search through websites of the Department for Culture Media and Sport and the Department of Health were undertaken. Documents were analysed to identify content relevant to four key elements of PA policy.
Milton & Grix, 2015 [154]	National (1 country)	Public health policy and walking in England	Analysed year: 2008 (Interviews in 2012)	This case study analysed *policy window* related to walking promotion using the *Multiple Streams* framework. Semi-structured interviews with experts from relevant organisations in walking sector were conducted. Literature and electronic search were performed to obtain relevant policy documents. Data from literature and interviews were analysed using the inductive content analysis.

Mota et al., 2016 [155]	National (1 country)	A wide range of PA indicators for children and youth in Portugal	2010 – 2016	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a committee that searched through available databases, official reports, and websites. It includes an assessment of *Government* as one of nine PA indicators.
Murphy & Waddington, 1998 [156]	National (1 country)	"Sport for All" policy in Great Britain	n/a	The study examines the objective to improve population's health outlined in "Sport for All" programmes and focuses on key social differences between PA and sport. Two case studies from Great Britain are presented.
Musingarimi, 2009 [158] Musingarimi, 2008 [157]	National (4 constituting countries)	Obesity policies	1992 - 2008 (documents from that period)	The study reviewed and comparatively analysed PA and nutrition policies related to obesity in four constituting countries of the United Kingdom. Twenty-two policy documents were identified through an Internet-based search and a literature review. The search was complemented by 15 semi-structured interviews with key informants such as policy makers, public health specialists, academics, and advocates from trade/voluntary organisations.
Nardo et al., 2016 [159]	National (1 country)	A wide range of PA indicators for children and youth in Brazil	n/a	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group of experts and stakeholders by reviewing several sources of national data and published peer-reviewed publications. It includes and assessment of *Government Strategies and Investments* as one of nine PA indicators.
Nishtar et al., 2006 [160]	National (1 country)	NCD Prevention Action Plan in Pakistan	n/a	The article describes the development process, components, and content of the *National Action Plan on Noncommunicable Disease Prevention, Control, and Health Promotion* in Pakistan.
Nyström et al., 2016 [161, 162]	National (1 country)	A wide range of PA indicators for children and youth in Sweden	2005 – 2015	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by assessing relevant research studies and policy documents in Swedish and English. It includes and assessment of *Government Strategies and Investments* as one of nine PA indicators. Two additional indicators related to diet and obesity were included in the RC.
Ocansey et al., 2016 [164]	National (1 country)	A wide range of PA indicators for children and youth in Ghana	1975 – 2015 (only for peer reviewed literature, not other documents)	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by experts from ministries, NGOs, and higher education institutions. They reviewed data related to PA in children and youth from the following sources: peer-reviewed literature; published and unpublished theses/dissertations; and school physical education/sports syllabi and documents. The RC includes an assessment of *Government – Strategies, Policies, Investments* as one of ten PA indicators.

Ocansey et al., 2014 [163]	National (1 country)	A wide range of PA indicators for children and youth in Ghana	1975 – 2013	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a team of researchers by reviewing available documents and research. It includes an assessment of *Government – Strategies, Policies, Investments* as one of nine PA indicators.
Oja & Titze, 2011 [234]	Global overview	PA recommendations	n/a	The article provides an overview of PA recommendations around the World. Content of the WHO recommendations, American College of Sports Medicine and the American Heart Association recommendations, and the US national recommendations are presented.
Onywera et al. 2016 [165, 166]	National (1 country)	A wide range of PA indicators for children and youth in Kenya	n/a	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a work group by reviewing information from the following data sources: peer-reviewed literature; unpublished graduate student theses; presentations at peer-attended fora; and data from relevant organisations and agencies. It includes an assessment of *Government and Nongovernment* (*Strategies, Policies, Investments)* as one of nine PA indicators.
Pate et al., 2011 [37]	International (10 countries)	PA policies in children and youth	n/a	In the study, a review of government and non-government policy documents in Chinese and English that promote PA in children and youth was conducted. Documents were searched through databases and websites of, for example, national public health institutions, the WHO, and health ministries.
Pérez-Escamilla, 2016 [167]	National (1 country)	National dietary and PA guidelines in Mexico	n/a	The article describes the development process and the content of the document the *Mexican Dietary and Physical Activity Guidelines.*
Piggin & Heart, 2017 [169]	National (1 country)	PA advocacy and policy in the United Kingdom	2012 – 2014 (media reports analysis)	The study analyses how PA in the United Kingdom has been framed as key policy issue using the *Multiple Stream*s framework. *Meso*, *micro,* and *macro* parts of the agenda setting were assessed. The analysis included: government statements; media reports; the policy change initiative *Tackling Physical Inactivity: A Co-ordinated Approach*; publicity material from policy communities and interest groups; and social media interactions. This was combined with participant observation.
Piggin, 2008 [168]	National (1 country)	Sport and recreation policy in New Zealand	from January 2002 to December 2007	This doctoral dissertation discusses "dissemination and challenge" of policies written by *Sport and Recreation New Zealand.* Data were gathered through several sources including: policy documents; media articulations of policy; public debate over policy; and two semi-structured interviews with key informants. Data collection techniques included: observations; interviews; media and policy analysis; and reflexive journal. Thesis was guided by a critical discourse analysis.

Pilar Rodriguez et al., 2012 [170]	National (1 country)	A wide range of PA indicators for children and youth in Mexico	2009 – 2011	This *RC on PA for Children and Youth* was created by a panel of experts by reviewing: government reports; peer-reviewed literature; websites with relevant data or information; and state and federal programmes and laws. It includes an assessment of *Policy and programmes* as one of six PA indicators.
Pratt et al., 2016 [171]	International (4 countries)	PA research and policy	n/a	The study reported on the interplay between PA policy and research using four case studies from Australia, Brazil, Mexico, and the United Kingdom.
Prévot-Ledrich et al., 2016 [172] (in French language)	National (1 country)	HEPA policies	November 2014 – January 2016	The study reviewed HEPA public policies in France by using the second version of HEPA PAT. Data were collected through a document search and by conducting 15 interviews with experts. Data were validated and discussed at a one-day workshop.
Prista et al., 2016 [173]	National (1 country)	A wide range of PA indicators for children and youth in Mozambique	2014 – 2016	This article reported on results from a *RC on PA for Children and Youth*. The RC was created by the *Research Group for Physical Activity and Health* by reviewing relevant websites, reports, and databases. The research group used questionnaire and conducted interviews to obtain additional data. The RC includes an assessment of *Government* as one of nine PA indicators.
Prista et al., 2014 [174]	National (1 country)	A wide range of PA indicators for children and Youth in Mozambique	n/a	This article reported on results from a *RC on PA for Children and Youth*. The RC was created by the *Research Group for Physical Activity and Health* by reviewing reports, databases, and websites. Due to a lack of information, the research group distributed questionnaire among group members and established direct contacts with NGOs and government institutions. The RC includes an assessment of *Policy* as one of nine PA indicators.
Ramadan et al., 2010 [175]	National (1 country)	National PA plan in Kuwait	n/a	This article describes principles and background behind the development of the *National Physical Activity Plan* for Kuwait.
Ramirez Varela et al., 2017 [176] Ramirez Varela et al., 2016 [32]	International (217 countries)	PA surveillance, policy, and research	up to 2013	This almanac and the associated journal article contain RCs on PA for 217 countries. Data were obtained through Internet search. Data for 139 countries were reviewed and approved by country contacts. The RCs reported on the availability of national or sub-national PA plans, which was one of six PA indicators.
Reddy et al., 2007 [177]	National (1 country)	A wide range of PA indicators for children and youth in South Africa	1999 – 2007	This *RC on PA, Nutrition and Tobacco use for Children and Youth* was created by a scientific advisory panel by reviewing available data sources that were peer-reviewed and published or already presented in a peer-reviewed forum. Some data were drawn from unpublished studies which had peer-reviewed study designs. It includes an assessment of

				Legislation: Sport and Education as one of the indicators related to PA promotion.
Reilly et al., 2016 [180, 181]	National (1 country)	A wide range of PA indicators for children and youth in Scotland	2013 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing available evidence. Consultations with a stakeholder group were undertaken to provide additional information and feedback. The RC includes an assessment of *National Policies, Strategies and Investment* as one of ten PA indicators.
Reilly et al., 2014 [179] Reilly et al., 2013 [178]	National (1 country)	A wide range of PA indicators for children and youth in Scotland	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing available evidence. Formal online consultations with stakeholders were undertaken to provide additional information and feedback. The RC includes an assessment of *National Policies, Strategies and Investment* as one of ten PA indicators.
Rodriguez Martinez et al., 2014 [182, 183]	National (1 country)	A wide range of PA indicators for children and youth in Mexico	2010 – 2013	This *RC on PA for Children and Youth* and the associated journal article were created by a Mexican RC work group by reviewing literature in Spanish and English. The RC includes an assessment of *Government* as one of nine PA indicators. Grades for indicators were assigned by consensus during a meeting with members of AHK Canada RC team.
Roman-Viñas et al., 2016 [184]	National (1 country)	A wide range of PA indicators for children and youth in Spain	2006 – 2015	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group. The group's Chair conducted a narrative review and gathered key information. The RC includes an assessment of *Government* as one of nine PA indicators.
Rütten et al., 2013 [185]	International (8 countries)	Supportive environments for leisure-time PA	n/a	The study analysed supportive environments for PA, community action and policies in eight EU member states. It provides a comparative analysis of the following countries: Czech Republic, Denmark, Finland, France, Germany, Lithuania, Portugal, and Spain. The study was based on a secondary analysis of Eurobarometer data and the data collected as part of the EU funded research project entitled *Improving Leisure-time Physical Activity in the Local Arena* (IMPALA). In the IMPALA project data were collected by semi-structured interviews with key informants, focus groups, and document analysis.
Salinas & Fio, 2003 [186] (in Spanish language)	National (1 country)	Health and PA policies in Chile	n/a	The study analyses PA as part of Chilean health promotion policy. It describes and analyses several key strategies related to PA promotion.
Schranz et al., 2016 [190, 191]	National (1 country)	A wide range of PA indicators	2014 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing the best available national- and state-based PA data. It

		for children and youth in Australia		includes an assessment of *Government Strategies and Investments* as one of 12 PA indicators.
Schranz et al., 2014 [188, 189]	National (1 country)	A wide range of PA indicators for children and youth in Australia	2008 – 2014	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing the best available national- and state-based PA data. One state-based survey and a number of national surveys were used as data sources. The RC includes an assessment of *Government – Strategies, Policies, Investments* as one of 12 PA indicators.
Sember et al., 2016 [192]	National (1 country)	A wide range of PA indicators for children and youth in Slovenia	2005 – 2015	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing: data compiled from national databases; research findings published in peer-reviewed journals; and government initiatives. The RC includes an assessment of *Government – Strategies, Policies, Investments* as one of nine PA indicators.
Seppälä et al., 2017 [39]	National (1 country)	Policy recommendations related to PA, nutrition and SB in Finland	Most recent document, search in September 2016	The study is a "behaviour change wheel" guided content analysis of six key national policy documents related to worksites. Policy recommendations targeting employees' PA, SB, and nutrition were coded. A systematic search of the websites of ministries and research institutes operating under ministries was conducted.
Sharif et al., 2016 [193, 194]	National (1 country)	A wide range of PA indicators for children and youth in Malaysia	2009 onward	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing key data sources. An external expert validated the proposed grades for PA indicators and supporting evidence. The RC includes an assessment of *Government Strategies and Investments* as one of 11 PA indicators. The *Annual Report of Ministry of Health* (2012) was the key data source that informed the assessment of this indicator.
Skille & Sobakken, 2011 [195]	National (1 country)	Sport (policy) and its relation to health in Norway	n/a	The study analyses how health is treated within sport policy in Norway. Historical books were examined to retrieve information about sport policy before 1973. Six contemporary policy documents were also analysed. On the general level, the analysis is hermeneutic.
Smith et al., 2016 [196]	National (1 country)	Sport, PA, public mental health policies in England	1995 – 2016	This article is a critical overview of PA, community sport, and public mental health policy. Eighteen key policy documents published from 1995 to May 2016 in England were analysed.
Standage et al., 2014 [197]	National (1 country)	A wide range of PA indicators for	n/a	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group, a Scientific Officer, and a Chief Scientific Officer. The Scientific Officer identified key articles and

		children and youth in England		gathered available evidence. The RC includes an assessment of *Government Strategies and Investments* as one of nine PA indicators.
Stratton et al., 2014 [199]	National (1 country)	A wide range of PA indicators for children and youth in Wales	2007 – 2014	This *RC on PA for Children and Youth* was created by an expert group by reviewing relevant data. The group discussed development of the RC at five meetings. Delphi approach was used to achieve grading consensus for eight PA indicators. The RC includes an assessment of *National Policy, Strategy, and Investment* as one of the indicators. The assessment of the indicator was informed by seven key policy documents.
Stuji & Stokvis, 2015 [200]	National (1 country)	Sport and PA policy in the Netherlands	Since 1950s (documents)	This case study analyses Dutch PA/sport-related policy documents published by national sport organisations and the government using a historical sociological perspective.
Tammelin et al., 2016 [201, 202]	National (1 country)	A wide range of PA indicators for children and youth in Finland	"most current evidence"	This *RC on PA for Children and Youth* and the associated journal article were created by a work group by reviewing eight key data sources. The RC includes an assessment of *Government Strategies, Policies, and Investments* as one nine PA indicators.
Tan, 2015 [203]	National (1 country)	National fitness policy in China	Until 2015	The study analyses changes in China's national fitness policy using five policy change indicators. It employs the analytical framework of elite theory. Twenty-five semi structured interviews with officials from national governing sports bodies and six interviews with sport academics and journalists were conducted. Media publications and government policy documents were analysed.
Tanaka et al., 2016 [204, 205]	National (1 country)	A wide range of PA indicators for children and youth in Japan	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing relevant data. The RC includes an assessment of *Government Strategies and Investments* as one of 11 PA indicators. National laws, strategies, policies, and ordinances were reviewed to inform the assignment of the grade to this indicator.
Tremblay et al., 2016 [34]	International (38 countries)	Global matrix of grades related to PA in children and youth	RCs from 2015 and 2016	This publication contains consolidated findings of RCs on PA in children and youth. RCs include an assessment of a wide range of PA indicators for children and youth, including the indicator *Government Strategies and Investments*. Nine common indicators from 38 countries are presented. Data collection methods, quality and quantity of data, and available evidence varied across the countries. Each indicator was graded by the group of experts in charge of their country's RC.
Tremblay et al., 2014 [33]	International (15 countries)	Global matrix of grades related to	RCs from 2013	This publication contains consolidated findings of RCs on PA in children and youth. The RCs include an assessment of wide range of PA indicators for children and youth, including the

		PA in children and youth	and 2014	indicator Government Strategies and Investments. Nine common indicators from 15 countries are presented. Data collection method, quality and quantity of data, and available evidence varied across the countries. Each indicator was graded by the group of experts in charge of their country's RC.
Tremblay et al., 2011 [206]	National (1 country)	PA guidelines in Canada	n/a	The study describes the development process and the content of the Canadian PA guidelines for children, youth, adults, and older adults.
Tyler et al., 2016 [207] Stratton et al, 2016 [198]	National (1 country)	A wide range of PA indicators for children and youth in Wales	2013 – 2015 ("the most recent at the time")	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing relevant data sources. The RC includes an assessment of *National Government Policy, Strategies and Investments* as one of ten PA indicators. The grade for this indicator was informed by: strategy documents; policy documents; and other publically available guidance.
Uys et al., 2016 [208]	National (1 country)	A wide range of PA indicators for children and youth in South Africa	2011 - 2016	This article reported on the results from a *RC on PA and Nutrition for Children and Youth.* The RC was created by a work group by reviewing dissertations, peer-reviewed manuscripts, grey literature, government reports, and websites. The RC includes –PA- and nutrition-related indicators. It includes an assessment of *Government—Strategies, Policies*, *Investments* as one of ten PA indicators.
Vallgårda, 2015 [209]	International (4 countries)	Obesity policies	2008 - 2011	The study analyses national plans for reducing the prevalence of obesity using the "concept of problematisation". Policies from England, France, Germany, and Scotland were compared.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	International (12 countries)	National policies for promotion of PA, physical fitness and nutrition	n/a	This conference paper and presents an overview of the availability of national PA/physical fitness and nutrition policies in Europe. The article also reports on nationwide PA initiatives. Data were gathered by a network of formal and informal experts.
Vuori et al., 2004 [10]	National (1 country)	PA policy development in Finland	1974 – 2004	The article presents an overview of policies related to PA and sport in Finland. The full policy development over 30 years and policy and programme evaluation are described.
Vuori et al., 1998 [211]	National (1 country)	Influenced national PA programmes on local level in Finland	n/a	The study describes the PA policy development in 1990s and two national PA promotion programmes in Finland – *the Finland on the Move* and the *Fit for Life*. It reviews their purpose and implementation, their evaluation, and the types of projects within these two programmes.
Wachira et al., 2014 [212, 213]	National (1 country)	A wide range of PA indicators for	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a stakeholder and reviewer group. The RC was informed by two systematic literature reviews and the following sources: data from

		children and youth in Kenya		government organisations and practitioner communities; graduate student theses; and the *International Study of Childhood Obesity, Lifestyle and Environment*. It includes an assessment of *Government and Nongovernment* (*Strategies, Policies, Investments)* as one of ten PA indicators.
Wijtzes et al., 2016 [214, 215]	National (1 country)	A wide range of PA indicators for children and youth in Belgium	n/a	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by reviewing relevant data. The RC includes an assessment of *Government Strategies and Investments* as one of 9 PA indicators. Data sources to inform this indicator included policy documents and websites on federal and local regulations/rules. Two additionally assessed indicators were related to dietary behaviours and weight status.
Wilkie et al., 2016 [216, 217]	National (1 country)	A wide range of PA indicators for children and youth in England	2013 – 2016	This *RC on PA for Children and Youth* and the associated journal article were created by an expert panel by reviewing: several national surveys; government reports; reports from the Office for Standards in Education, Children's Services and Skills; and regional reports and datasets from other organisations. The RC includes an assessment of *Government Strategies and Investments* as one of nine PA indicators.
Woods & Mutrie, 2012 [218]	National (2 constituting countries)	PA policy	n/a	The article outlined a rationale for PA promotion and the decrease of physical inactivity from a public health perspective. It presents two case studies in relation to PA policy from Ireland and Scotland.
World Health Organization, 2015 [233]	International (28 countries)	A wide range of HEPA indicators	n/a	This publication contains country factsheets related to HEPA promotion in the EU. It is an overview of information related to monitoring, surveillance, and policy response. The WHO/EU PA focal points provided and validated PA-related data for their countries. For each member state a "country profile" was created from the data collected using a questionnaire on 23 HEPA indicators.
World Health Organization, 2014 [232]	International (22 countries)	PA promotion in Eastern Mediterranean region	September – December 2013	This publication reports on PA promotion in 22 countries of the Eastern Mediterranean region. Information about policies was collected through HEPA PAT completed by each country's focal point. The focal points were selected individuals from: relevant ministries; the WHO country office; or academic institutions. Twelve countries submitted their responses.
World Health Organization, 2010 [228]	International (27 countries)	Prevention of obesity, unhealthy nutrition, and insufficient PA	Data were collected during first six months of 2009	This is a report of a meeting of the network of the National Information Focal Points. The report is a part of a joint WHO/European Commission monitoring project on obesity. One of the project's seven work packages dealt with *National policies and actions*. The WHO national focal points collected data on public policies and policy documents on diet, nutrition, and physical activity, and also data

				on public-private partnerships and voluntary actions by economic actors.
World Health Organization, 2010 [229]	International (WHO European Region and EU)	Prevention of obesity, unhealthy nutrition and insufficient PA	n/a	This publication is a report from a meeting of representatives of the National Information Focal Points from the EU member states and the representatives of the WHO Nutrition Counterparts from the WHO European Region member states. The representatives reviewed and discussed the progress made in obesity prevention, improvement of PA and nutrition, and implementing policy action. Detailed reports are given for six countries; namely Germany, Hungary, Macedonia FYR, Poland, Switzerland, and the United Kingdom.
World Health Organization, 2010 [230]	International (10 countries)	Health inequity in children and adolescents	n/a	This publication is a summary of results from the WHO/Health Behaviour in School-aged Children Forum. It contains case studies from ten countries related to socio-environmentally determined health inequities. Six case studies include information about national PA policies for Armenia, England, Germany, Ireland, Norway, and Poland.
World Health Organization, 2010 [12]	International (27 EU member states)	PA promotion policy development and legislation	1993 – 2010 (only the most recent documents taken into account)	This publication is a review/report on PA policy development and legislation in EU member states. One hundred thirty-nine included documents were identified by searching for relevant key words and on the websites of: health promotion agencies; national ministries; subnational and local initiatives; and other activities and projects aiming at PA promotion. The search was complemented by a questionnaire sent to the WHO Nutrition Counterparts and by country-specific templates completed by National Information Focal Points.
World Health Organization, 2007 [227]	International (48 - WHO European region)	Policy development related to nutrition, PA, and obesity prevention	n/a	This publication is a report on policy developments related to nutrition, PA, and obesity. It is a product of the review of the information obtained from: national policy documents in English; publications; reports of the WHO meetings; websites of national public health institutions; databases; and websites of ministries of environment, health, and transport.
Wu, 2014 [219]	National (1 country)	Network governance of *Active Canada 20/20*	n/a (oldest document analysed – 1987)	This master thesis explores the movement of *Active Canada 20/20: A Physical Activity Strategy and Change Agenda for Canada.* This case study used "network governance*"* as its theoretical framework. The policy and document analyses were complemented with 12 semi-structured interviews and one direct observation.
Xu et al., 2014 [220] (in Chinese language)	International (2 countries)	PA in *Healthy People*[7] programme	1979 - 2010	The study assessed the content, development, objectives, and implementation of the USA *Healthy People* programme. The last section of the paper provided a comparison of the Programme to *Health China 2020* policy and recommendations for China.

[7] A wrong translation of the programme name (*Healthy Citizen* instead of *Healthy People*) was used in the paper.

Yoonkyung et al., 2016 [221, 222]	National (1 country)	A wide range of PA indicators for children and youth in South Korea	2011 – 2015	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group by conducting a systematic literature review of peer reviewed articles and government reports in English and Korean. National surveys were preferred data sources. The RC includes an assessment of *Government Strategies and Investment* as one of ten PA indicators.
Zaabi et al., 2016 [223, 224]	National (1 country)	A wide range of PA indicators for children and youth in United Arab Emirates	1998 – 2014 (dates of published data sources used)	This *RC on PA for Children and Youth* and the associated journal article were created by a research work group, a Chief Scientific Officer, and a Scientific Officer. The officers searched and reviewed the available evidence. The RC includes an assessment of *Government Strategies and Investments* as one of nine PA indicators.
Zembura et al., 2016 [225]	National (1 country)	A wide range of PA indicators for children and youth in Poland	2013 – 2015 (data collection)	This article reported on the results from a *RC on PA for Children and Youth*. The RC was created by a research work group by reviewing key data sources. It includes an assessment of *Government Strategies and Investments* as one of nine PA indicators.

AHK = Active Healthy Kids; EU = European Union; HALO = Healthy Active Living and Obesity Research Group; HEPA = health-enhancing physical activity; HEPA PAT = Health-enhancing physical activity policy audit tool; NCD = Noncommunicable disease; NGO = Nongovernmental organisation; PA = physical activity; RC = report card; SB = sedentary behaviour; USA = United States of America; WHO = World Health Organization

Full text of the articles available in English, if not noted otherwise.

Appendix B3: Additional file 3: Summary results of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies: country-specific findings

Country / Study	Summary national-level findings
Albania	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
World Health Organization, 2010 [229]	- PA is integrated in an umbrella public health strategy: *Albanian health reform project. Towards a healthy country with healthy people – public health and health promotion strategy 2002-2010*.
American Samoa	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Andorra	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Angola	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Antigua and Barbuda	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015*.
Argentina	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Armenia	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2010 [230]	- Obligatory requirements related to PE classes and standard of sport facilities are mentioned in the law on sport for children and adolescents. - The *National strategy on child and adolescent health 2009 – 2015* was approved in 2009. - Promotion of sport among young people was established by the National Olympic Committee and the President of Armenia. - NGO-led initiative received funds from the Government to raise public awareness related to healthy lifestyles.
Aruba	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National Plan Aruba 2009-2018 for fight against overweight and obesity related health issues*.
Australia	
Coenen et al., 2017 [38]	- *Australia's physical activity and sedentary behaviour guidelines* (2011) recommend concrete measures for reduction of SB, such as breaking up long periods of sitting or walking to a colleague instead of calling or emailing them. - *Officewise - A Guide to Health and Safety in the Office* (Government, 2008) states that various tasks should involve a change in "involve a change in posture and muscles used to perform the work". - More detailed suggestions how to reduce SB have been proposed in the factsheets published by the Government – *Benefits for movement – Be upstanding*, *Strategies to help you stand up, sit less move more* (2014), *The business case for reducing sedentary work* (2015).
Pratt et al., 2016 [171]	- National Heart Foundation of Australia is considered the central promoter of policy reform related to PA. - Department of Infrastructure and Transport issued an urban policy that focuses on promotion of active transport (2011).

	- Multisector coalitions have had impact on Australian active living policy.
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Schranz et al., 2016 [190, 191]	- The assigned grade for the indicator *Government – Strategies, Policies, Investments* from *RC on PA for Children and Youth* is D. - Major concern is that the Australian Government has not established an overarching strategy or a national PA plan. - Recommendations on the minimum amount of PA and the maximum duration of uninterrupted SB are included in the *Australian PA and SB Guidelines.* - Government withdrew main positive initiatives, since the RC from 2014 was released
Schranz et al., 2014 [188] [189]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is C+. - Government introduced major initiatives such as *National Partnership Agreement on Preventative Health*, *Healthy Children*, and *Active After-School Communities.* - Establishment and implementation of coherent national PA policy and increased awareness of the PA guidelines is needed.
Bellew et al., 2011 [8]	- Examples of evidence based policy actions for PA promotion (2009-2010) related to social marketing and mass media setting: the *Measure up* campaign the *National PA and healthy eating campaign,* and inter sectoral *Premiers PA Task Force Strategic Plan* (2007-11). Several other campaigns such as *Find thirty everyday,* mass media campaign (2nd phase 2009-11).
Brown et al., 2011 [43]	- National policy document: *Be Active Australia draft National Physical Activity for Health Action Plan* was published by the National Public Health Partnership in 2004.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity (details not specified) are general and not quantifiable and measurable. - Australia adopted the *National Chronic Disease Strategy*.
Pate et al., 2011 [37]	- The data were extracted from the documents by the National Public Health Partnership - Be *Active Australia: Draft National Physical Activity for Health Action Plan* (2004), *Be Active Australia: A Framework for Health Sector Action for Physical Activity, 2005–2010* (2005). - PA policy measures were found in the following areas: a) health education (e.g. enable training for healthcare professionals in schools in motivational interviewing techniques related to PA); b) community environmental support (e.g. create parks, playgrounds, and open spaces that are interesting and challenging for youth and children); c) school environmental support (e.g. encourage schools to conduct fitness tests of their students annually and store the collected data); d) active transport/urban design (e.g. organise a designated car drop off zone half a kilometre from schools and support it by organised walking to school from the zone); e) mass media/advertising campaigns (e.g. use celebrities with positive image to become spokespersons for PA promotion).
Koh, 2010 [136] (in Korean language)	- In 1999, the Department of Health and Ageing of the Australian Government issued the *National Physical Activity Guidelines for Australians*. They contained 4 recommendations: movement should be considered as opportunity, not inconvenience; every day be active in as many ways as possible; put together a minimum of 30 minutes of moderate PA on most, preferably all days a week; engage in regular vigorous PA for extra fitness and health benefits.
Bornstein et al., 2009 [79]	- Target groups specified in the comprehensive national PA plan *Be Active Australia: A Framework for Health Sector Action for Physical Activity 2005-2010* are: aging Australians; populations with special needs; children; Aboriginal Australians; and disadvantaged adults.
Bellew et al., 2008 [6]	- Australian PA policy was reviewed against nine (HARDWIRED) criteria. The “Active through multi-strategic, multi-level partnerships”, “highly consultative in development” and “widely communicated” indicators are partially achieved. Partial progress is seen in “developed in stand-alone and synergistic policy modes”, “evidence-informed and evidence-generating”, and “role-clarified and performance-delineated” indicators. The only substantially achieved criteria is “defined national guidelines for HEPA”. There is no progress regarding “independent evaluation” and little progress regarding whether policy is “resourced adequately”.
Bellew in Bull et al., 2004 [74]	- *Developing an Active Australia: a framework for action for physical activity and health* (launched by the Federal Health Minister in 1998) – first response of the health sector

	on *Active Australia.* - Active Australia Alliance issued a draft of a national plan (2000-2003), but it has never been ratified. The Alliance was supposed to ensure a coordinated approach at the national level, but it foundered.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- *Active Australia* (launched in 1996) emphasizes PA as a priority area at all governmental levels. It was developed after consultations of experts and state/territory agencies and it uses multiple strategies related to environments, education, evidence, and infrastructure. It operates through a cooperation between all governmental levels and uses intersectoral approach formalised by the Active Australia Alliance. In order to provide coordinated national action, Active Australia is linked to other national strategies and receives federal financial support (total amount not documented). Its identity is recognised through media campaigns and a logo. One of its results was the formation of the Strategic Inter-Government forum on PA and Health (SIGPAH).
Fullagar, 2003 [105]	- First phase of the *Active Australia* was extended from 1997 until 2001. It aimed to build partnerships between State and Federal government departments in recreation and health. The main goal was to promote benefits of PA among the entire population. Within campaign's discourse women are considered a sedentary population. It acknowledges the importance of ensuring infrastructure to support active living, but that seems to be of a lesser priority than modifying individual leisure behaviour.
Fullagar, 2002 [104]	- Before the Commonwealth Department of Tourism and Recreation had been established in 1972, discourse related to health and leisure was organised predominately around PE and fitness that had "distinct masculine- and military-related origins". - *Life be it!* became nation-wide campaign in late 1970s. It emphasised improved life quality through active leisure. It produced an image of body that experiences leisure as a psychotherapeutic enterprise. - *The Active Australia* emerged in late 1990s with national and state focus. Within it there is "a moral prescription" that PA is good and that inactivity is a result of an ineffective management of time.
Egger et al., 2001 [102]	- *National PA Guidelines for Australians* (1999) were developed in three major steps: establishing set of science-based guidelines acceptable for major stakeholders; assessing the guidelines in the general population to ensure they have potential for motivating inactive individuals to become more active and ensure they are easy to understand; providing the final assessment by Scientific Advisory Board to assure that their scientific validity was not compromised by changes made due to consumer feedback.
Austria	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National Action Plan for Physical Activity (Nationaler Aktionsplan Bewegung)* is available.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Austrian recommendations for health-promoting physical activity*, issued in 2010. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations for adults are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults and recommendations on SB for children/young people.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity (details not specified) are general and not quantifiable and measurable. Perspective to reach objective is ten years.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Fit for Austria Charter* (2007); *Cycling master plan: strategy for the promotion of cycling traffic in Austria* (2006); *Austrian strategy for sustainable development* (2002); and *Principle of health education* (1997). - Since 2009, there has been a coordinating mechanism in the area of PA promotion, and the leasing institution has been the Ministry of Sport. The participating stakeholders are government departments on sport, health, and education.
World Health Organization, 2007 [227]	- The Fund for Healthy Austria and Austrian Organisation for Sport initiated projects related to nutrition and PA (in 2006) under umbrella concept *Fit for Austria*.

Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. National walking programme is identified as one of the nationwide activities for the promotion of physically active lifestyle.
Azerbaijan	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
World Health Organization, 2010 [229]	- Policy documents in the PA area are not available.
Bahrain	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National Strategy for Nutrition and Physical Activity 2014* is available (MOH, Undersecretary for Primary Care).
World Health Organization, 2014 [232]	- There are national NCD strategic plans or policies that include goals focused on PA (details not specified). - There are NCD committees that address and coordinate PA. - The WHO global recommendations on PA are formally adopted. - Besides the general population, the population groups covered in national policy documents are: early years children; children and young people; older adults; workforce/employees; women; people with disabilities; people with chronic disease; sedentary/the most inactive; and families. - Settings covered by national policy documents: kindergarten; primary schools; high schools; colleges/universities; primary health care; clinical health care; workplace; senior/older adult services; sport and leisure; and urban design/planning.
Bangladesh	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Barbados	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Barbados strategic plan for the prevention and control of Non-Communicable Diseases 2015-2019*.
Belarus	
World Health Organization, 2007 [227]	- *Health of the People*, a national-level programme implemented between 1999 and 2005,covered areas such as health and lifestyle, health and environment, labour and health. - In 2003, the Council of Ministers approved the *Concept of the development of public health for 2003–2007*.
Belgium	
Coenen et al., 2017 [38]	- The *Flemish consensus statement regarding balanced diet and physical activity* (type of document classified as guidelines), published by the Ministry of Welfare, Public Health and Family (2012), mentions reducing SB.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *The Flemish Draft Action Plan on Nutrition and Physical Activity* is available.
Wijtzes et al., 2016 [214] [215]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is C+. - The *Flemish Action plan for nutrition and physical activity 2009-2015* (2008) has the goal to enhance healthy nutrition and PA among the general population and includes many strategies, priorities, and actions. One of the strategies is to provide good quality and accurate information to health care professionals related to PA, nutrition, and SB. - Obligatory requirement of at least two hours of PE per week for children and youth has been a part of Flemish national legislation.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *National Food and Health Plan, Physical activity in Belgium: scientific consensus paper,* issued in 2007. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults. - The document does not include recommendations on SB.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- There is a document related to sport promotion (only a subnational document available) entitled *Policy brief: 2009–2014 sport: through teamwork we score – towards a healthy, sustainable, results-oriented sports policy* [Beliedsnota: 2009–2014 Sport: Door samenspel scoren – Naar en gezond, duurzaam, resultaatgericht sportbelied]

	(2009).
World Health Organization, 2015 [233] [8]	- Target groups and policies vary across Flemish-, French-, and German-speaking regions. - Belgium has not implemented a scheme for active travel to work.
Brown et al., 2011 [43]	- The national policy document: *Draft action plan on diet and physical activity 2008–2015* was published by the Ministry of Welfare Public Health and Family in 2008.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity.
World Health Organization, 2010 [228][9]	- Belgium has decentralised health policy. - Policy documents relevant for the promotion of PA in Belgium are mainly subnational.
World Health Organization, 2010 [12]	- *National plan on nutrition and health 2005–2010* was issued by the Federal Public Health Service for Health, Food Chain Safety and Environment in 2006 and falls within the public health sector. - Since 2005, there has been a national coordinating mechanism for the promotion of PA, and the leading institution is the Federal Public Service of Public Health, Food, Safety and Environment. The participating stakeholders are government departments on sport, health, research, and education. - Five subnational documents in public health, sport, and transport sectors are mentioned in this publication.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. Youth sport campaign is identified as one of the nationwide activities for the promotion of physically active lifestyle.
Bermuda	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Bhutan	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Lachat et al., 2013 [140]	- In 2009, the Bhutan Ministry of Health issued the *National policy and strategic frame-work on prevention and control of non communicable diseases*. - National policy includes the following targets and actions for PA promotion: national standards for PA and an Act that regulates built environment to uphold active living need to be established, put focus on sedentary and urban population, and support regular physical fitness and walking; level of PA among general population should be increased by improving the understanding about the link between PA and health; it should be advocated for increasing PA among the general population through the worksites; supportive environments should be created and education materials should be designed for supporting PA in children; Dratsang and the Ministry of Health will cooperate to incorporate training sessions and information on PA. - Policy contained strategies for PA promotion focused on workplaces and specific strategies to address sedentary lifestyles.
Bolivia	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Bosnia and Herzegovina	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Botswana	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Brazil	
Nardo et al., 2016 [159]	**-** The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is D. - *National Plan of Body Practices and Physical Activity* aims to introduce public policies at the local level.

[8] Other findings from this study are not country-specific and are presented in the Additional file 4.
[9] Other findings from this study are not country-specific and are presented in the Additional file 4.

	- Actions within *Growth Acceleration Program of Health 2007–2010* have been implemented. Main goals include: promote PA and the implementation and creation of projects in public recreational areas and schools; increase access to information related to healthier lifestyles; support investments in healthier urban spaces. - Government strategies and programmes exist but their reach is limited (e.g. a key federal programme involved only 0.27% of Brazilian adolescents and children).
Pratt et al., 2016 [171]	- *New National Health Promotion Policy* (2006) listed PA among seven priority areas. - The Ministry of Health initiated cooperation with research centres and universities from the USA and Brazil to better evaluate community PA programmes and provided financial support to local health departments for implementation of such programmes.
Ramirez Varela et al., 2016 [32]	- PA mentioned in the documents *Politica Nacional de promocao de Saude*, and *Plano de Enfrentamento de Doencas Cronicas Nao Transmissiveis.*
Gomez, 2015 [108]	- Since 1999, *National Policy of Nutrition* (*Política Nacional de Alimentação*), besides focusing on nutrition, also proposes increase in PA. - In 2010, *Plano de Ações Estratégicas para o Enfrentamento das Doenças Crônicas Não Transmissíveis no Brasil*, was passed by the Congress and it established guidelines for anti-obesity initiatives for the next ten years. The plan includes a funding initiative entitled *National Policy and Health Promotion, Physical Activity, & Nutrition.*
Lachat et al., 2013 [140]	- In 2011, the Ministry of Health issued the *Strategic action plan to tackle noncommunicable diseases in Brazil: 2011–2022*. - National policy included the following targets and actions for PA promotion: support PA in children on everyday basis; active aging should be promoted and elderly population. encouraged to participate in regular PA; support creation of healthy urban spaces; promote a healthy lifestyle and leisure PA for children and adolescents; promote PA at the population level; enhance PA levels during leisure time; establish education and communication campaigns for promotion of health through PA; create agreements with productive sectors to implement PA programmes. - National policy targets for PA are proposed in the policy. - The need to promote PA among elderly is also indicated in the policy.
Da Silva, 2007 [96] (in Portuguese language)	- The end of 19th century was marked by understanding PA as a mean to maintain people fit and prepare them for a possible international conflict. - In 1920, the War minister issued a regulation for obligatory PE for boys and girls older than 6 years in all private and public schools. - From 1930s, soccer was linked with the national identity. This was especially strengthened in the 1950s, when the Government brought the World Cup to Brazil. The Government controlled popular music and media to portray sport and PA as good moral values. Radio broadcasts and periodicals praised the political regime and emphasised “sport should be at the service of the country”. - Federal Government exploited PA and sport to legitimise their actions especially during the Estado Novo regime.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- *National Program for Physical Activity Promotion Agita Brazil* was established in 2000 and is being implemented by the Ministry of Health and funded by the Government. Its main goal is to promote health by increasing population’s PA levels. It puts a special focus on people with NCDs. The programme is associated with the *Plan for Reogranisation of Blood Hypertension and Diabetes Mellitus Care* by the Federal Health Department. - *National Food and Nutrition Policy* (Ministry of Health 1999) also mentions increased PA as one of goals.
Brunei Darussalam	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National Physical Activity Guidelines 2011 BruMAP – NCD 2013-2014* is available.
Bulgaria	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the documents entitled *National for prevention of chronic non-communicable diseases 2014-2020* and *National Health Strategy 2014-2020.*
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- *National strategy for the development of physical education and sports in the Republic of Bulgaria 2010–2020* (published in 2009) outlined that key objectives of the sport and PE system are to improve physical fitness and health of the population and increase the sporting image of Bulgaria, through creating conditions for systematic participation in sport and PE by all people.

World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National strategy for development of physical education and sport in Bulgaria 2010–2020* (2010); *National programme of sport for all* (2009); *National programme of sport for children in their free time* (2009); *National strategy and national programme for development of physical education and sports in Republic of Bulgaria, 2009–2013 (*2009); *National Strategy for Children 2008–2018* (2008); *National Health Strategy 2008– 2013* (2008); *National Programme for Environmental Health 2008–2013* (2008); *National programme for the development of school education and preschool training and preparation 2006–2015* (2008); *National Programme for Child Protection* (2006); *National Food and Nutrition Action Plan 2005–2010* (2005); *National strategy and national programme for development of physical education and sports in Republic of Bulgaria 2005–2008* (2005); *The Health Law* (initially published in 2004 and updated in 2008); and *Law for Physical Education and Sports* (initially published in 1996 and updated in 2008). - Since 2003, there has been a coordinating mechanism in the area of PA promotion. The leading institutions have been the Science and State Agency of Youth and Sports, the Ministry of Health, and the Ministry of Education. The participating stakeholders are: government departments on education and research, sport, and health; NGOs; media; academia; private sector; and communities.
World Health Organization, 2007 [227]	- Several national programmes are available for PA promotion in children and youth such as *Education through Sport* (2004) and *Sport at School* (2006).
Cambodia	
Lachat et al., 2013 [140]	- In 2006, the Ministry of Health—Department of Preventive Medicine issued *National strategy for the prevention and control of noncommunicable disease: Cambodia, 2007–2010.* - National policy includes the following targets and actions for PA promotion: modify school programme for promotion of women in sport and PA; increase public awareness of healthy lifestyles and the deficiency of PA as a risk factor, especially among women; create presentation materials on PA; engage media and sports personalities in PA promotion; create local strategies for PA promotion; develop suitable sport facilities for university students and school children; gather data on available public parks and bicycle ways. - The policy includes concrete actions for the involvement of private sector in PA promotion. - The policy targeted community at large.
Cameroon	
Clarke & Ojo, 2017 [93]	- The Ministry of Youth and Sports (1992) created the Ministry of Sports and Physical Education (2009) which has 5 departments: PE; high performance sport development; standards and sports organisations monitoring; studies, planning and cooperation division; general affairs. - Sport is mainly led by the Government and it is an important aspect of the policy, understood as moral and physical imperative. - PE is a part of core curriculum in schools and six key national standards are leading it: regular participation in PA; value PA for enjoyment, challenge, health, social interaction, and self-expression; maintain and achieve a health-enhancing fitness level; show responsible social and personal behaviour that respects others and yourself; demonstrate an understanding of movement principles, concepts, tactics, and strategies, as they apply to PA performance and learning.
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Canada	
Coenen et al., 2017 [38]	- *Protect your back!* (2007) guideline by the Government, states that low back pain, upper back pain and neck pain can be the consequences of prolonged continuous daily sitting in front of computer screen or desk. - *General Guide for Identifying Ergonomics-Related Hazards* (Government, 2011) states that remaining in the sitting posture for more than 6 hours/day is considered risky. This Guide also recommended avoiding prolonged standing, particularly on a hard surface.
Ramirez Varela et al., 2016 [32]	- PA plans entitled *Active Canada 20/20: A Physical Activity Strategy and Change Agenda for Canada; Canadian Sport Policy* and *Framework for Recreation in Canada* are available.

Active Healthy Kids (AHK) Canada, 2016 [58] Barnes et al., 2016 [71]	- The assigned grade for the indicator *Strategies and Investments (Government)* from *RC on PA for Children and Youth* is B-. - For the first time, *sleep* is included as an indicator in RC – Canada issued a *24 hour Movement Guidelines for Children and Youth* that emphasize relationship between PA, SB, and sleep. - Sport Canada maintained annual contributions of around $16M towards enhancing sport opportunities for children and youth (in 2015-16).
AHK Canada, 2015 [57]	- The assigned grade for the indicator *Strategies & Investments (Government)* from *RC on PA for Children and Youth* is B-. - The Federal Government increased PA funding compared to the last year. - The Public Health Agency of Canada is collaborating with various private and non-government organisations to address physical inactivity within a collaborative project *Mobilizing Knowledge for Active Transportation.*
AHK Canada, 2014 [56] Gray et al., 2014 [111]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is C. - *Canadian Sport Policy* was renewed. - Less than one per cent of total health care budget is spent on PA, PE, sport, and health promotion. - The Public Health Agency of Canada released *Preventing Chronic Disease Strategic Plan 2013-2016*
Wu, 2014 [219]	- *Active Canada 20/20: A Physical Activity Strategy and Change Agenda for Canada* (2012) – the strategy to promote mass PA was mainly influenced by the neoliberal ideology. - Other important documents related to PA are: *Canadian Sport Policy* (2002, 2012); *Non Communicable Disease Prevention: Investments that Work for Physical Activity* (2011); *Creating A Healthier Canada: Making Prevention A Priority* (2010); *Curbing Childhood Obesity: A Federal, Provincial and Territorial Framework for Action to Promote Healthy Weight* (2009); *The Integrated Pan-Canadian Healthy Living Strategy* (2005); *Pan-Canadian Physical Activity Strategy* (2004); *Physical Activity and Sport Act* (2003); and *National Recreation Framework* (1987).
AHK Canada, 2013 [55]	- The assigned grade for the indicator *Policy – Federal Government Strategies and Investments* from *RC on PA for Children and Youth* is C-. - Federal government did not issue its own national PA plan. - Gas tax fund is a good source of financial support for infrastructure related to active transport. - $205,933,000 is the planned spending for *Sport Canada* (federal level, year 2012-13).
AHK Canada, 2012 [54] Barnes et al., 2013 [72]	- Grades and findings for indicators from *RC on PA for Children and Youth under category Policy:* 1) *Federal Government Strategies:* assigned grade is D. - *Active Transportation in Canada: A Resource and Planning guide* (released in 2011). - No national strategy focused only on PA promotion 2) *Federal Government Investments:* assigned grade is F. - Children Fitness Tax Credit – between $90M and $115M in annual federal tax revenue.
AHK Canada, 2011 [53]	- Grades and findings for indicators from *RC on PA for Children and Youth* under the category Policy. 1) *Federal Government Strategies*: assigned grade is C. 2*) Federal Government Investments:* assigned grade is F. - Funding for PA promotion organisations (AHK Canada, Canadian Society for Exercise Physiology etc.) was reduced. - Public Health Agency of Canada supported *Canadian Sedentary Behaviour Guidelines for School Aged Children and Youth* (2011) issued by the Canadian Society for Exercise Physiology, Healthy Active Living and Obesity research Group – the 1st evidence-based and systematic recommendations of the kind in the World.
Bellew et al., 2011 [8]	- *ParticipACTION* was established in 1971 and relaunched in 2007. It is a "national voice" for sport and PA participation.
Brown et al., 2011 [43]	- There is a national policy document entitled *The Toronto Charter for physical activity: A global call for action* (2010) created by the Global Advocacy Council for Physical Activity.

Ceccarelli et al., 2011 [90]	- In a policy document (details not specified), indirect and direct costs of chronic diseases related to weight and the cost related to physical inactivity are presented. - The following specific goal for PA is stated in the policy document: by 2015, increase the proportion of people who participate in regular, 30 minutes per day of MVPA, by 20%.
Craig, 2011 [95]	- Canada has a multisectoral, multilevel approach in PA policy. - The document *Physical inactivity: a framework for action; towards healthy, active living for Canadians* is a common framework for all the levels of the government that guides the development of strategies for PA promotion. It was developed by the Federal-Provincial/Territorial Advisory Committee on Fitness and Recreation in 1997.
Tremblay et al., 2011 [206]	- New Canadian PA Guidelines were developed in 2011 and provide specific recommendations for four age groups: children (5-11 y.o.), youth (12-17 y.o.), adults (18-64), older adults (65 years and over). They were developed by the Canadian Society for Exercise Physiology, *ParticipACTION*, and other stakeholders. The Government's Public Health Agency of Canada provided support.
AHK Canada, 2010 [52]	- Grades and findings for indicators from *RC on PA for Children and Youth* under the category *Policy:* 1) *Federal Government Strategies:* assigned grade is C+. - PA component of the Healthy Living Strategy should be supported with an implementation plan. *2) Federal Government Investments:* assigned grade is F.
Koh, 2010 [136] (in Korean language)	- *Canada's physical activity guide to healthy active living* was issued in 1998 by the Public Health Agency of Canada. It was developed through the process of scientific review by various experts and in cooperation with relevant agencies and organisations.
AHK Canada, 2009 [51]	- The assigned grade for the indicator *Federal Government Strategies and Investments* from *RC on PA for Children and Youth* is C. - Federal budget for 2009 included additional $500M to build and renew recreation and sport facilities in the next two years. - Children's Fitness Tax Credit has been transformed to meet the need of families with lower income. - Bilateral provincial and federal funding announcements were made, especially directed at the facilitation of *Sport Canada's Policy on Sport for Persons with a Disability* and at Aboriginal population initiatives, but implementation process of the initiatives is unclear. - It is recommended to establish national PA Policy coordinated by the Government.
AHK Canada, 2008 [50]	- The assigned grade for the indicator under category *Policy - Progress and Government Strategies and Investments* from *RC on PA for Children and Youth* is C+. - Federal budget announced $24M investment in supporting sport.
AHK Canada, 2007 [49]	- The assigned grade for the indicator under category *Policy - Progress and Government Strategies and Investments* from *RC on PA for Children and Youth* is C. - *Sports Canada's Policy on Sport for Persons with a Disability* – encouragement of involvement in sport for people with disabilities with financial support of $12.5M. - *Canada's Physical Activity Guides for Children and Youth* – inactive youth and children (6-14 y.o.) should increase level of PA by minimum 30 min/day and decrease screen time by at least 30 min/day.
Bergsgard et al., 2007 [76]	- *Fitness and Amateur Sport Act* (1961) emphasised importance of mass sport participation. However, around 1970, focus of the federal Government shifted towards elite sport neglecting support of general PA. It was mostly limited to the active lifestyle and promotion of individual fitness. An indication of change is visible in *The Canadian Sport Policy* (2002) through the treatment of "Sport for All", where the main objective was to increase the quality and level of active participation for all people.
AHK Canada, 2006 [48]	- The assigned grade for the indicator under category *Policy - Progress and Government Strategies and Investments* from *RC on PA for Children and Youth* is C -. - Children Fitness tax credit announcement – non-refundable tax credit (max $500) for an enrolling child (under 16 y.o.) in PA programme (to begin in 2007). - The Government announced commitment to spend at least one per cent of federal health funding per year on PA and amateur sport programmes for school children.
AHK Canada, 2005 [47]	- The assigned grade for the indicator under category *Policy - Federal Strategies and Investments* from *RC on PA for Children and Youth* is C-. - *Physical Activity and Sport Act* was established.

	- *Public Health Agency of Canada* was established. - *Canada Physical Activity Guidelines* (1989) recommend working towards 90 additional minutes of MVPA for children and youth.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- Sport Canada and Health Canada (Fitness and Active Living Program Unit) are the key institutions responsible for national PA policy, which is mentioned in the *Fitness and Amateur Sport Act* (1961). - *ParticipACTION* (1971) is a fitness initiative, established by the Health Canada to promote PA for a healthy lifestyle. - *Physical Inactivity: A Framework for Action – Towards Healthy, Active Living for Canadians* (1997) provides a base for (sub)national governments to determine priorities related to physical inactivity.
Bercovitz, 1998 [75]	- The Minister's Task Force on Federal Sport Policy published a report *Sport: The Way Ahead* in 1992. It provided a comprehensive analysis of sport in Canada and provided over hundred recommendations to enhance sport at all levels. The report outlined the need for shift within the sport system to incorporate a "Sport for All" focus. Four key themes dominated: create community-based and athlete-centred sport system; promote ethics, fair play, and values in sport; ensure accessible and equitable sport; and establish innovative and new strategic alliances and partnerships, particularly between Active Living and sport.
Bell-Altenstad & Vail, 1995 [73]	- When *Fitness and Amateur Sport Act* passed in 1961, federal government formally started to get involved with amateur sport. - In 1986, Sport Canada published *Women in Sport* policy that addressed gender inequities in sport and outlined five key barriers affecting women's sport participation.
Cayman Islands	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Chile	
Aguilar-Farias et al., 2016 [60]	- The assigned grade for the indicator *Government – Strategies, Policies, Investments* from *RC on PA for Children and Youth* is C. - No national PA recommendations or guidelines. - *National Policy for Sports and Physical Activity* coordinated by the Ministry of Education, the Ministry of Sports, and the Ministry of Health to be launched in 2017. - The Ministry of Sports was founded in 2013 and received an annual budget of 0.02% of the GDP. In 2015, it invested 0.16% of its annual budget in sport and PA for children and youth - There is no indicator of the effectiveness of PA promotion programmes and policies. Written policies from different institutions are often overlapping or are in discrepancy.
Lagos et al., 2016 [141]	- The public programme *Choose to live healthy* (CHP) was transformed in 2013 into a Republic law (Ministry of Social Development) - *Ley 20.670*. It states that healthy diet, PA, family life, and outdoor activities can contribute to the prevention or reduction of the risk factors associated with NCDs. It also mentions that regular PA practices reduce the risk of NCDs such as cardiovascular disease, depression, breast or colon cancer, and diabetes type II, and that sport allows people to better control their weight and achieve energy balance. - Due to high rates of obesity and sedentarism, the programme tries to solve those public issues by recommending PA and sport that are interpreted as "good movement" as opposed sedentarism which is "bad movement". Within the programme, sedentraism is presented as a danger that can make people become seriously ill.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Elige vivir sano, Programa dependiente del Ministerio de Desarrollo Social Estrategia Nacional de Salud para el cumplimiento de los Objectivos Sanitarios de la Decada 2011-2020.*
Bravo & Silva, 2014 [81]	- From 1920s to 1940s, sport was perceived as a vehicle for readiness for war. This link with military ended in 2001 with the *Law 19712*. The General Directorate for Sport and Recreation stopped being accountable to the Ministry of National Defence (sub-secretariat of War) and moved to the Ministry of General Secretariat of Government. - One key provision of the Constitution has been responsible for order in the Chilean sport system – people have the right to freely organise themselves by also recognising the autonomy of the organisation.

	- *Law 17276*, known as the law for the *Promotion of Sport* (1970) mentions promotion of professional and amateur sport activities, implementation and promotion of recreation programmes, administration of sporting facilities, and implementation and promotion of coaching education programmes. - The division of Physical Activity and Sport is involved in the implementation of programmes and plans (as stated in *Sports Law*, that is *Ley del Deporte* 2001) and has four departments – high performance, mass sports, research and development, and sport organisations. The recreational unit of the Department of Mass Sport promotes active sport participation as a vehicle for social integration and focuses on target groups such as children, adults, and elderly.
Lachat et al., 2013 [140]	- In 2002, the Ministry of Health issued *Objetivos sanitarios para la decada 2000–2010*. - National policy includes the following targets and actions for PA promotion: the promotion of PA at worksites; dissemination of the PA guidelines among the school and preschool children and in the general population; and the development of population guidelines. - The policy included detailed actions and specified implementation plan for stakeholders.
Salinas & Fio, 2003 [186] (in Spanish language)	- *National Plan for Health Promotion* was issued in 1999 by the Ministry of Health. - PA is one of five key priority themes in this general health promotion policy. Policy is supervised by the *Vida Chile* Council. National targets related to PA and SB highlight the need to reduce the prevalence of SB (in the population aged 15 years or more) by seven per cent by 2010 and to rebuild public spaces to become suitable for healthy lifestyles. - The Ministry of Health, the Ministry of Education, the National Sports Institute, and universities adapted the Canadian programme *Challenge for Active Living*, and pilot tested it to be applied in schools and in the community.
China	
Liu et al., 2016 [144]	- The assigned grade for the indicator *Government* from *RC on PA for Children and Youth* is D - In 2007, the State Council of the P.R. China issued the document *Promoting physical activity and enhancing physical fitness of children and adolescents* (No. 7 Central Document). - Low awareness of the policy (only 26.7% of parents were aware of it) was the key reason for the low grade. - Since 2007, the Ministry of Education and the State Council have released funds and issued several policies to support PA promotion among children and youth.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National regulations on fitness* is available.
Tan, 2015 [203]	- After the Bejing Olympic Games, a major shift happened in Chines sport (for all) policy and the idea to co-develop *sports for all* and elite sport occurred. - State Council issued the *Regulation on National Fitness* (2009) that all governmental agencies under the State Council need to follow. It is outlined that, according to the law, people have the right to engage in *"Sport for All"* activities and local governments are obliged to have special budget for mass sport participation. - The Government published the *White Paper – National Fitness Program Implementation* in 2011. General Administration of Sport outlined five key problems in the Programme: insufficient number of sport instructors who can often engage in mass sport promotion; insufficient number of fitness facilities as a key barrier for mass sport promotion; low proportion of people who regularly participate in sport, particularly among young children; and private and nongovernmental organisations playing limited role in sport promotion due to constraints by China's administrative structure.
Xu et al., 2014 [220] (in Chinese language)	- Unlike the US *Healthy People*[10] initiative, *Healthy China 2020* lacks an effective communication with public and external stakeholders. Its objectives are not specific enough to become feasible. It also lacks emphasis on PA and PA's role in disease prevention. Furthermore, it lacks an effective channel for the on-line promotion and communication with public (e.g. it has no website). - *Healthy China 2020* is the first version, so it should be continued and improved.
Lachat et al., 2013 [140]	- In 2012, the China Ministry of Health issued *China national plan for NCD prevention*

[10] A wrong translation of the programme name (*Healthy Citizen* instead of *Healthy People*) was used in the paper.

	and treatment, 2012–2015. - National policy includes the following targets and actions for PA promotion: promote the working model for social sport and healthy lifestyle instructors by the communities; develop fitness and sports environment; enable secondary and primary students to engage in at least one hour of exercise per school day; increase the ratio of the people who exercise regularly to 32%; create healthy environment and promote regular exercise; enhance scientific guidance for mass sport; gradually enhance public sport facilities' utilisation and accessibility; and increase quality evaluation and monitoring for the environment.
Lu & Henry, 2011 [146]	- The period from 1949 until 1977 was characterised by Government's intention to improve people's fitness for labour and national defence. *The New Sports* ideology presented Government's guidelines and intention to develop sport in rural areas. - In 1981, the directive entitled *Instruction on Caring about People's Cultural Life*, published by the Communist Party, focused on people's life quality and aimed to guide people's recreational activities to promote healthy culture. - In 2004, policy *Year of Rural Sports* was published by the General Administration of Sports. It aimed to provide sport facilities, knowledge, and instructions in rural areas.
Pate et al., 2011 [37]	- Policy related to PE in schools states that: children should engage in at least two hours of PE a week; PE should be taught by highly qualified and certified teachers; and the PE curriculum should be included in the school review process. - Policy related to community environmental support states that: public sports facilities and venues should be free or offered at discounts to students; parks, playgrounds, and open spaces that are interesting and challenging for youth and children should be created; community organisations and local authorities should be supported, funded, and encouraged to develop PA promotion programmes for families to get them active and use the existing infrastructure; and cooperation between colleges, youth clubs, and schools with community groups, local authorities, and health professionals to design programmes for maximising involvement in PA should be encouraged. - Policy related to school environmental support states that: access to a broad range of activities such as dance, sports, active travel, play, exercise, and being active in daily tasks around and in school should be provided; schools should be encouraged to conduct fitness tests of their students annually and store the collected data; parks around schools and school playgrounds should be renovated and designed to inspire sport, movement, play, and outdoor education; award should be given to schools for promoting holistic health in the school setting, including the promotion of PA among students, parents, and staff. - The data were extracted from the following documents: *Views of Strengthening Youth Sports and Enhancing Their Physical Fitness* (Central Committee of the Communist Party of China and State Council of China, 2007); *Sports Law of the People's Republic of China* (1995); and from the documents issued by the Ministry of Education of China and General Administration of Sports China - *Views of Further Strengthening School Sports and Enhancing Student's Physical Fitness* (2006); *Decision of Sunny Sports* (2006), *National Standards for Students' Fitness and Health* (2002, 2007); and *Notice of Popularizing the First National Primary and Secondary School Group Dance* (2007).
Chen in Simonopoulos (ed.), 1997 [91]	- "Sports for All" plan was in place since late 1995 and was integrated in the second chapter of the *Sports Law of the People's Republic of China* in order to develop mass sports activities. Key targets of the plan by the 2010 include: achieving a well-coordinated development of national economy, sports, and social affairs; completing a basic "Sports for All" system provided with distinctive Chinese features; improving the Chinese national health level and physique. - Great importance will be given to the exercise for minorities, women, elderly, and people with disabilities, whilst the priority is put on youth and children.
Colombia	

González et al., 2016 [109]	- The assigned grade for the indicator *Government* from *RC on PA for Children and Youth* is B. - National investment in sport and PA was 50% lower in 2016 than in 2014. - PA is supported from a multisectoral perspective including sports, transport, education, social development, and health sector. - *National Development Plan* (2014-2018) is new policy for social development and sports. PA programmes are seen as means that can help, in the post-conflict era, to rebuild social cohesion. It also outlines that the Ministries of Transport, Education, and Housing will create plans for promoting active transport to school. - Through the strategy *Al colegio en bici*, bicycle loans to students are provided along with basic bicycle skills training and designing safe routes to school. *Muevete Escolar* promotes PA in schools through communication strategies, interventions, and education. - Coldeportes (national body) runs the national programme *Healthy Habits and Lifestyle*, which offers regular PA sessions led by trained instructors in public spaces. Sessions are available for all ages. During 2015, it was implemented in six capital cities and 20 out of the 32 departments in Colombia.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Programa Nacional de Actividad Fisica Colombia Activa y Saludable* is available.
González et al., 2014 [110]	- The assigned grade for the indicator *Policy* from *RC on PA for Children and Youth* is "4". - There is a substantial number of policies for PA promotion (e.g. *Plan nacional de desarrollo 2010-2014*). - There are PA promotion programmes with national coverage such as *Healthy Habits and Lifestyle Programme of Coldeportes* and the network of *Ciclovias-Recreativas.* - In 2014, national investment in sport and PA was 174M USD. - Current policies lack the evaluation of their effectiveness. There is still a large gap between concrete actions and written policies.
Costa Rica	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National Plan for Physical Activity and Health 2011-2021* is available.
Lachat et al., 2013 [140]	- National policy (details not specified) includes the following targets and actions for PA promotion: the promotion of PA, recreation, and healthy lifestyles.
Croatia	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *The Republic of Croatia National Action Plan for Health Enhancing Physical Activity* is available.
Kahlmeier et al., 2015 [127]	- National PA recommendations are currently in the development process (the documents published until summer 2012 were reviewed).
World Health Organization, 2007 [227]	- *Food and nutrition action plan 2006–2010* has obesity prevention as an overall goal and focuses not only on nutrition but also on PA. - *Croatian food and nutrition policy* developed in 1999 by the Ministry of Health and Social Welfare and the Croatian National Institute of Public Health contains objectives for the promotion of PA, healthy nutrition, and healthy lifestyles.
Cuba	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Plan nacional de actividad fisica del Instituto Nacional de deportes, Educacion Fisica y Recreacion* is available.
Lachat et al., 2013 [140]	- In 2006, the Ministry of Public Health issued *Proyecciones de la salud pública en Cuba para el 2015*. - National policy includes the following targets and actions for PA promotion: decrease SB prevalence to 32% in the population group older than 15 years; increase the percentage of adults engaged in PA to 40%; at worksite and at the population level, promote intersectoral participation in "systemic" PA. - The policy contained specific strategies to address sedentary lifestyles.
Cyprus	
World Health Organization, 2010 [12]	- *National Nutrition Action Plan* issued in 2007 by the Ministry of Health mentions PA. - Since 2005, there has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the Ministry of Health. The participating stakeholders are: government departments on education and research, health, sport and food; academia; NGOs; media; and the private sector.

Czech Republic	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Health for all in 21st Century.*
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- A document related to sport promotion is entitled *National programme for the development of sport for all* (2000). It mentioned the link between non-organised sport and natural environment (e.g. walking paths, bicycle lanes and cross-country skiing tracks) and emphasised sport facilities should be accessible for all people. It has no time frame and has a strong focus on supporting PA and sport for a broad population. - Four ministries are responsible for the implementation of the strategy. - Budget in the strategy for PA, sport, and healthy lifestyle is four million koruny (cca €164 629) over two years, but there is no overall budget or budget for other activities.
Rütten et al., 2013 [185]	- Public policies related to LTPA: *National Programme of sport development for all* (2000) and *National Cycling Strategy* (2004). - Local, regional, and national budgets and money from lottery funds are granted for the promotion of voluntary sports organisations. - Supportive environments for LTPA (indoor/outdoor sport facilities, infrastructure for LTPA) are broadly available. Urban and green spaces, usable for LTPA, are partially available.
Kudláček et al., 2012 [139]	- There is no comprehensive policy at the national level focused on LTPA infrastructure. - *Sport Promotion Act* (*Zakon o podpore sportu* 115/2001, 219/2005) defines the position of sport in the society and different tasks for regional and local authorities. It mentions their responsibility for: creating conditions enabling sport participation; "Sport for All" development; and construction, maintenance, and reconstruction of sport facilities. - *Government Resolution No. 17/2000 - the National Programme for the Development of Sport for All* (*Usnesení Vlády ČR č. 17/2000 k Národnímu programu rozvoje sportu pro všechny*) aims at transforming social and infrastructural conditions for lifelong healthy lifestyle promotion. It emphasised the need to provide opportunity for as many citizens as possible to engage in safe PA that does not harm the environment. This is the key document related to LTPA infrastructure and it is based on PA surveillance data for Czech Republic. - *Government Resolution No. 673/2003 – Guidelines on the State Policy in Sport for the years 2004-2006* (*Usnesení Vlády ČR č. 673/2003 ke Směrům státní politiky ve sportu na léta 2004–2006*) mentioned the Ministry of Education, Youth and Sports as the responsible authority for sport (e.g. elite sport, sports events, school sport, "Sport for All", sport infrastructure, science and research, athletes with disabilities, anti-doping programmes). - *Government Resolution No. 678/2004 - National Strategy for the Development of Cycling (Usnesení Vlády ČR č. 678/2004 k Národní strategii rozvoje cyklistické dopravy České republic)* has four priorities focused on developing infrastructure and conditions to enhance cycling in Czech Republic. - *State support for sport* (*Státní podpora sportu*) is a document published annually by the Sports Department of the Ministry of Education, Youth and Sports. It outlines financial investments in sport at the national level. Some programmes within the document are focused on the "Sport for All" development, school sport, development of sport for people with disabilities, and the support to the PA and sport infrastructure.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National cycling development strategy of the Czech Republic* (2005), *National Programme of Sport Development for All* (2000), and *Programme for Health Promotion* (2000). - There is no coordinating mechanism in the area of PA promotion.
Kalman et al., 2008 [129]	- There are no national-level interventions for PA promotion. - Government does not encourage people to be more active and does not recognise physical inactivity as a serious risk factor for NCDs. - Creation of a strategy for PA promotion is proposed.
World Health Organization, 2007 [227]	- *National action plan against obesity* is to be developed by the National Council for Obesity and should be based on the *WHO global strategy on diet, physical activity and health.* - In 2005, the Ministry of Transport issued a *National cycling development strategy.*

Denmark	
Larsen et al., 2017 [143] Larsen et al., 2016 [142]	**-** The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is A-. - The Danish Foundation for Culture and Sports Facilities, established in 1994, continuously supports leisure- and PA-related projects. - *The Day-care Act* outlined "movement and body" as one of six key learning themes. *The Education Act* requires from schools to ensure that all children get at least 45 min of PA per day while at school. - The need to establish more specific recommendations on reducing screen time and time spent in SB and raise awareness about the importance of that reduction was emphasised.
Hämäläinen et al., 2016 [115]	- HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; national/regional/local politically elected councils; intersectoral committees or working groups for HEPA; steering committees; administrative working groups including only public sector officers; formal consultation on HEPA policy for stakeholders; private sector involvement in policymaking; public hearings for citizens. - There are no: field visits to make a policy; contacts between public sector officers responsible for HEPA between levels; scientific advisory groups/institutes/individuals; and established systems of policymaking.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Healthier life for all.*
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Physical activity guidelines,* issued by the Danish Health and Medicines Authority. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults. - The document does not include recommendations on SB.
Rütten et al., 2013 [185]	- Public policies related to LTPA: *Healthy throughout Life 2002-2010*, *National Action Plan against obesity* (2003), *Danish Act of General Education* (1991), and *Act of General Education* (1991) that replaced *Leisure-time Act* (1969) which stated that municipalities are responsible for providing adequate infrastructure for youth/children premises and for covering expenses for organised PA and leisure time instructions for adults. - Supportive environments for LTPA (indoor/outdoor sport facilities, infrastructure for LTPA, and urban/green space for LTPA) are broadly available.
Brown et al., 2011 [43]	- National policy document: *Healthy throughout Life – the targets and strategies for public health policy of the Government of Denmark, 2002–2010* was published by the Ministry of the Interior and Health in 2003.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity. - The document includes a thorough analysis of PA and eating habits of the population. - Stakeholders related to PA and sport mentioned in the policy document are sports goods manufacturers and advertising and recreation businesses. - *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted, "partly different sets of actions within the designated areas of common priority".
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Nordic Plan of Action on better health and quality of life through diet and physical activity* (2006), *National action plan against obesity – recommendations and perspectives* (2003), *Better health for children and young people* (2003), and *Healthy throughout life – the targets and strategies for public health policy of the Government of Denmark, 2002–2010* (2002). - There is no coordinating mechanism in the area of PA promotion.
Daugbjerg et al., 2009 [11]	- Policy document *Healthy throughout Life 2002-2010* (2003) does not contain quantifiable PA goals and budget for policy implementation, but it does contain a

	requirement/intention for evaluation.
Branca et al., 2007 [80]	- Policy document *National action plan against obesity: recommendations and perspectives* (2003) proposed to develop a monitoring system for nutrition conditions, PA, body weight, and environmental determinants. - Denmark's National Board of Health highlighted the need for transport policy that enhances PA opportunities in everyday life (e.g. car free cycling and pedestrian areas, providing bicycle parking connected with public transport and worksites).
World Health Organization, 2007 [227]	- *Health throughout Life 2002-2010*, a public health strategy, focuses on the major risk factors such as obesity, physical inactivity and unhealthy nutrition. - 2007 was proclaimed by the Minister of Health and Internal Affairs as the year of *Denmark on the move* emphasising the importance of PA for all age groups.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. - The prevention of the ischemic heart disease is highlighted as one of the nationwide activities for the promotion of a physically active lifestyle.
Djibouti	
Lachat et al., 2013 [140]	- National policy (details not specified) includes the following targets and actions for PA promotion: build playgrounds; and promote PA.
Dominica	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Dominican Republic	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Programa Nacional de Cultura Fisica y Deporte* (2014-2018) is available.
Ecuador	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the documents entitled *Plan Nacional "Buen Vivir" 2013-2017 / Ecuador Ejercicate.*
Egypt, Arab. Rep.	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
World Health Organization, 2014 [232]	- Ministries of sport, youth and education have a leadership role regarding PA. - Presence of legislation that mentions the requirements for the PE curriculum across different school grades was identified.
England	
Coenen et al., 2017 [38]	- In the publication *Start active, stay active - A report on physical activity for health from the four home countries' chief medical officers*, issued by the Government's Department of Health in 2011, it is stated that "all adults should minimise the amount of time spent being sedentary (sitting) for extended periods".
Piggin & Heart, 2017 [169]	- *Moving More, Living More: The Physical Activity Olympic and Paralympic Legacy for the Nation* (2014) has a goal to promote PA among the population and increase PA by engaging partners across all levels and sectors to work together. - The main idea of the *Everybody Active, Every Day: An Evidence-based Approach to Physical Activity* (2014) is: "A plan to engage with many different sectors and employers to make the case for much more physical activity, every day".
Hämäläinen et al., 2016 [117]	- The document *Places People Play – delivering a mass participation sporting legacy from the 2012 Olympic and Paralympics Games 2011–2015* states goals such as: investment in regionally important multi-sport facilities; deploy and train 40,000 Sport Makers; create disability programme to inspire people with disabilities to participate in sport; and improve and protect playing fields across the country. The programme did not mention any equity issues except in some target groups (in respect to inequity between females and males).
Hämäläinen et al., 2016 [115]	- HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; scientific advisory groups/institutes/individuals; formal consultation on HEPA policy for stakeholders. - There are no: national/regional/local politically elected councils; contacts between public sector officers responsible for HEPA between levels; established systems of policymaking; intersectoral committees or working groups for HEPA; steering

	committees; administrative working groups including only public-sector officers; private sector involvement in policymaking; field visits to make a policy; and public hearings for citizens.
Pratt et al., 2016 [171]	- Government's Department of Health refers to an independent organisation - National Institute for Health Care Excellence (NICE) - regarding certain area to receive guidance on prevention and health promotion or treatment of ill health. PA was one of the first areas to be addressed by NICE in 2006. The best available scientific evidence was applied by NICE to inform the development of the following guidance documents: *Four commonly used methods to increase physical activity* (2006) and *Physical activity and the environment* (2008).
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Everybody Active, Every Day 2014* is available.
Smith et al., 2016 [196]	- Only some national policy documents related to community sport and PA had some references on the importance of PA, and sport and exercise for public mental health), but were often very vague. The most explicit discussion related to sport/PA and benefits for public mental health was found in the documents *Sporting Future: a new strategy for an active nation* (2015) and *At Least Five a Week: Evidence on the Impact of Physical Activity and its Relationship to Health* (2004). The latter has a whole chapter dedicated to PA, mental illness, and psychological well-being in adults. - None of the researched community sport/PA policy documents contained measurable, quantifiable goals and targets related to public mental health.
Wilkie et al., 2016 [216] [217]	- The indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* did not receive a grade, it was marked as incomplete, because an independent evaluation of policies and strategies is lacking. - No specific guidelines to address SB are available.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical Activity, Health Improvement and Protection. Start Active. Stay Active: A report on physical activity from the four home countries',* issued in 2011. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations for children/young people and adults are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults and recommendations on SB for children/young people, adults, and older adults.
Milton & Bauman, 2015 [40]	- The Department of Health and the Department for Culture Media and Sport are responsible for the promotion of sport and PA. - *Game Plan* (2002) was the first England's policy document that mentioned quantifiable targets for PA prevalence. The document contained many references to PA and emphasised the importance of the promotion of mass participation in both PA and competitive sports. - The *Strategy Statement on Physical Activity* (1996) by the Department of Health was informed by the Health Education Authority's symposium (1994) where over forty international and national experts reviewed the evidence to reach an agreement on what kind of messages should be promoted. The PA guidelines included in the document were endorsed in 2004 in the document entitled *At Least Five a Week* developed by the Chief Medical Officer. - In case of PA recommendations, England showed a robust scientific, evidence based approach.
Milton & Grix, 2015 [154]	- *Olympic and Paralympic Games*, in London (2012) were the key driver that made government engage more in promotion of walking. In 2008, £7M were invested into walking promotion. - Some of the national documents related to the promotion of walking: *Saving Lives: Our Healthier Nation* (1999); *Tackling Obesity in England* (2001); *Game Plan* (2002); *On the Move: By Foot* (2003); *At Least Five a Week* (2004); *Choosing Health—Making Healthy Choices Easier* (2004); *Walking and Cycling: An Action Plan* (2004); *The Future of Transport* (2004); *Choosing Activity—A Physical Activity Action Plan* (2005); *Making the Case: Improving Health through Transport* (2005); *Tackling Obesities—Future Choices* (2007); *Towards a Sustainable Transport System* (2007); *Delivering a Sustainable Transport System* (2008); *Before, During and After: Making the Most of the*

	London 2012 Games (2008); *Be Active, Be Healthy* (2009); *Active Travel Strategy* (2010); *Healthy Lives, Healthy People—Our Strategy for Public Health in England* (2010); *Start Active, Stay Active: A Report on Physical Activity from the Four Home Countries'* (2011); and *The Public Health Responsibility Deal* (2011).
Vallgårda, 2015 [209]	- In 2011, the document *Healthy Lives, Healthy People: A call to Action on Obesity in England* was published by the Department of Health. In the plan, individual's free choice is emphasised and a contradiction between Government's goal to ensure health and its goal to ensure freedom is present.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following documents related to sport promotion were identified: *Play to win: a new era for sport* (2008) and the action plan *Sport England strategy 2008–2011* (2008). In this study, the two policy documents were referred to as a single strategy - The strategy sets specific targets such as: to have two million more active people by 2012; to put coaching and competition in the focus of school sports system; and to offer five hours of PE/week to 5-16 y.o. children and adolescents.
Standage et al., 2014 [197]	- The indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* did not receive a grade, it was marked incomplete, because of the unclear impact of policies on increased participation in PA. - Number of policies relevant to adolescents' and children's health are in place, but only few are related to PA (e.g. *Giving all children a healthy start in life*, *Reducing obesity and improving diet*).
Jebb et al., 2013 [126]	- *Healthy weight, healthy lives: a cross-government strategy for England* was published by the Department of Health, Department of Children, Schools and Families, and the Cross-Government Obesity Unit in 2008. It was organised around the following five themes: healthy weight and growth for children; promotion of healthier diet; building PA into everyday lives – getting people to move as a regular part of their daily life; creating incentives for better health; personalised support and advice. - The *Physical Activity Children's Play Strategy* was in place from 2008 until 2010 and its main aim was an investment of £235M to develop 30 new adventure playgrounds and 3,500 play spaces. - *Start4Life* (2010) was a sub-brand of *Change4Life* strategy that targeted early years and pregnancy. Among other goals, it aimed to promote PA for infants.
Bellew et al., 2011 [8]	- Through the *Be Active Be Healthy* policy an initiative *Walk4life Miles* was developed by the Department of Health and Walk England. - *Well@work* is a pilot programme for worksite health promotion.
Brown et al., 2011 [43]	- The following national policy documents were identified: *Healthier Communities: Improving health and reducing health inequalities through Sport* (Sport England, 2008), and *At least five a week- evidence on the impact of physical activity and its relationship to health* (Department of Health Physical Activity Health Improvement and Prevention, 2004).
Ceccarelli et al., 2011 [90]	- In the policy document *Tackling Obesities: Future Choices – Qualitative Modelling of Policy options* (2007), indirect and direct cost of chronic diseases related to weight and the cost related to physical inactivity are mentioned. - In the policy document specific targets related to PA are set, such as: increase the level of participation in sport and PA by 2020, so 70% of population undertakes 30 minutes of PA five days a week; increase the number of school children who spend at least two hours per week doing school sport and high-quality PE, within and beyond the curriculum, to 75% by 2006 and to 85% by 2008 (compared to 25% in 2002); increase the number of people older than sixteen who participate in sport at least twelve times a year by 3%.
Katikireddi et al., 2011 [132]	- Many interventions in the white paper *Healthy Lives, Healthy People* are likely to be ineffective or there is a lack evidence showing their effectiveness. - Eleven statements in the document relate to increasing PA among adults and children. Evidence was found for school based interventions related to walking promotion, for volunteer led walks (e.g. *Walk Once Week, Walking for Health*), and for interventions related to structural changes (e.g. *Healthy Towns*, *Cycle Demonstration Towns*).
Gillon, 2010 [107]	- *Sport England Strategy 2008-2011* sets specific targets such as: one million more people engaged in sport by 2012-13; improved system of the talent development in minimum 25 sports; 25% reduced post-16 decline in sports participation in at least five sports by 2012-13 %.

Koh, 2010 [136] (in Korean language)	- The Department of Health's report from 2004 *At least five a week: evidence on the impact of physical activity and its relationship to health* stated that all adults should engage in at least medium intensity PA for at least 30 minutes on five or more days every week.
World Health Organization, 2010 [229]	- The campaign *Change4Life* was launched in 2009. It tackled a growing obesity problem and had a mission to encourage people to move more and eat well. It originally focused on children from five to 11 y.o., but it was extended to adults aged from 45 to 65 years and also early years children. An evaluation of the programme showed 99% of brand recognition.
World Health Organization, 2010 [230]	- The Government's Department for Children, Schools and Families set the goal to ensure that England is the best country for kids to grow up in. *The children's plan: one year on* and *The play strategy* were published in 2008. *The children's plan: building brighter futures* and *Aiming high for young people: a ten-year strategy for positive activities* were published in 2007. - The Department of Health issued *Healthy weight, healthy lives: a cross-government strategy for England* in 2008.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Active Travel Strategy* (2010); *Cycling and Health: a Strategy for 2005–2008 and Action Plan for 2005–2006* (2006); *The Framework for sport in England* (2004); *The Future of Transport, a Network for 2030, White Paper* (2004); *Walking and Cycling: an Action Plan* (2004); *Travelling to school: an action plan, England* (2003); *Game Plan, strategy for delivering the governments sport and physical activity objectives* (2002); and *Tomorrow's roads: safer for everyone. The Government's road safety strategy and casualty reduction targets for 2010* (2000).
Bornstein et al., 2009 [79]	- *Be Active, Be Healthy: A plan for getting the nation moving* was published by the Department of Health. Timeline for achieving goals was not identified. Target groups included, for example, people with CVD, diabetics, people with mental illness, ageing adults, and people with mental/physical disabilities. Some of the quantifiable targets included two million more active adults by 2012, increasing average weekly PA duration by cca 5% over the baseline.
Green, 2009 [112]	- The document *A Sporting Future for All and Sport: Raising the Game* put special focus on PE and school sport and elite sport development. It was mentioned that sport provides unique contribution regarding the problem of social exclusion. - In 2007, the Secretary of State for Culture Media and Sport made a claim about separation of *sport* from *physical activity.* Therefore, the Department for Culture, Media and Sport and Department of Health were in charge of developing the PA strategy for all, while Sport England kept its focus on sport participation and sport development.
Musingarimi, 2009 [158] Musingarimi, 2008 [157]	- *Healthy Weight, Healthy Lives: A Cross Government Strategy for England* - the "obesity strategy" - mentions PA as one of the key goals. - *Choosing activity: a physical activity action plan* (2005) aims to promote PA for all.
Daugbjerg et al., 2009 [11]	- Policy documents *Game Plan, Strategy for delivering the Government's sport and physical* *activity objectives*, published in 2002, with the time frame until 2020, and *Choosing Activity—a Physical Activity Action Plan—Working in partnership with people, their communities, local government, voluntary agencies and business* (2005) contain quantifiable PA goals, budget for policy implementation, and a requirement/intention for evaluation. - The document *The Future of Transport—a network for 2030—White Paper* (2004) does not contain quantifiable PA goals and a requirement/intention for evaluation but contains the budget for policy implementation. - The document *Walking and Cycling—an action plan* (2004) contains the budget and a requirement/intention for evaluation, but it does not contain quantifiable PA goals and a time frame. - The document *Tomorrow's roads: safer for everyone—the Government's road safety strategy and casualty reduction targets for 2010* (2000) does not contain quantifiable PA goals, budget and a requirement/intention for evaluation.
Bergsgard et al., 2007 [76]	- Publications *A Sporting Future for All: The Government's Plan for Sport* (2000) and *Game Plan*: *A Strategy for Delivering Government's Sport and Physical Activity Objectives* (2002) raised participation in sport higher on the national political agenda. - Responsibility for "Sport for All" development lies at the national level and is split

	between the Sport England ("quasi-autonomous non-government organisation") and the Department of Culture, Media and Sport.
Branca et al., 2007 [80]	- In 2005, the Department of Health issued *Choosing activity: a physical activity action plan* that sets detailed goals for schoolchildren and priority groups (e.g. minority and ethnic groups, people with mental or physical disabilities, women, and people with low socioeconomic status). - *Travelling to school: an action plan* mentions measures for schools, local governments, and national governments to promote more cycling and walking to and from school.
World Health Organization, 2007 [227]	- *Choosing activity: a physical activity action plan* was published in 2005 by the Department of Health. It includes the Government's plan to coordinate and encourage the action of various organisations and departments to promote increased participation in PA. Some of the mentioned actions include: PA and sport in schools; use of green spaces and transport plans; local actions to increase activity through sport; and enhancing PA levels through the use of pedometers (as advised by the National Health Service).
Cavill et al, 2006 [89]	- PA promotion as topic came latter on the agenda. In 1990s, no official government publication existed on PA benefits. That started to change in 2004 when *Report of the Chief Medical Officer in England* was published (Department of Health).
Murphy & Waddington, 1998 [156]	- Health benefits associated with PA were mentioned in the document *The health of the nation: a strategy for health in England* (1992), issued by the Department of Health and in the document *Young people and physical activity: promoting better practice* (1997), issued by Health Education Authority. - *Sport: Raising the Game* (1995) issued by the Department of National Heritage showed the lack of coordinated action between government departments.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There is a national policy for the promotion of PA entitled *Strategy Statement on Physical Activity.* Its main aim is to increase participation in moderate PA in everyday life.
Estonia	
Kruusamäe et al., 2016 [138]	**-** The assigned grade for the indicator *Government - strategies, policies, and investments* from *RC on PA for Children and Youth* is C. - *The General Principles of the Estonian Sports Policy until 2030*, approved by the Government in 2015 includes the key aims and developmental directions for lifelong PA. - Cooperation between ministries and cross-sectorial network for PA promotion should be improved.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National Health Plan 2009-2020.*
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Estonian Nutrition and Food Recommendations*. The document was issued by the National Institute for Health Development in 2006.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following document related to sport promotion was identified: *Strategic development plan for sport for all 2006–2010* [Liikumisharrastuse strateegiline arengukava 2006–2010]. The document was published in 2006. It emphasised that "Sport for All" should not be understood as a by-product of professional or elite sport, but circumstances have to be shaped so that every citizen can participate in sport. It also highlighted that sport facilities need to be within a short distance and mentioned it is important to address their quality, maintenance, lighting, and safety.
Ceccarelli et al., 2011 [90]	- *The Estonian National Strategy for Prevention of Cardiovascular Diseases 2005-2020* is focused on the following five strategic areas: PA; smoking; health care; nutrition; and securing local capacity and dissemination of information. - The policy document includes a thorough analysis of PA and eating habits of the population. - Specific quantifiable goals reported in the policy document include: by 2010, increase the percentage of people who undertake regular exercise to 45% of the population; and in the period between 2006 and 2010 increase the number of people who are involved in "Sport for All" by 20%.
World Health Organization, 2010 [12]	- The following national policy documents related to PA were identified: *National Health Plan 2009-2020* (2008); *Transport development plan 2006-2013* (2006); *Strategic development plan Sport for All 2006 – 2010* (2006); *Sport Act* (2005); *National strategy*

	for prevention of cardiovascular diseases 2005–2020 (2005); *National traffic safety strategy 2003–2015* (2003); *Estonian Sports Charter* (2002); and *Public Health Act* (1995). - Since 2006, there has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the Ministry of Culture. The participating stakeholders are: government departments on development, health, sport, and education and research; academia; media; communities; NGOs; and the private sector.
World Health Organization, 2007 [227]	- National strategy for the prevention of cardiovascular diseases was introduced in 2005 and includes four priority areas: PA; non-smoking; nutrition; and community development. - The Ministry of Culture prepared the *Estonian Strategic Development Plan, Sport for All 2006–2010* in 2006. It promotes the growth of the *"Sport for All"* movement among the general population, promotes PA to make it more available to everyone, and aims to increase the number of facilities for regular training as well as other opportunities for regular training.
Faroe Islands	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Annual campaigns by the Board of Public Health.*
Ceccarelli et al., 2011 [90]	- *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted "partly different sets of actions within the designated areas of common priority".
Fiji	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Fiji Plan of Action on Physical Activity* is in the consultation phase with stakeholders.
Finland	
Seppälä et al., 2017 [39]	- National policy documents that contain PA/SB recommendations are: the *National strategy for the reduction of sedentary behaviour* (2015); *Principles of good occupational healthcare practice guide* (2014); the *National strategy for physical activity promoting health and well-being 2020* (2013); and the *Action plan of the National Obesity Programme 2012–2015* (2013).
Hämäläinen et al., 2016 [117]	- The policy document *Development of health enhancing physical activity and nutrition 2008–2011* emphasised the importance of decreasing health inequality differences between population groups. - The policy document *Promotion of physical activity 2009–2012* emphasised the importance of providing equal opportunities for active living and PA. - The *Strategy for Walking and Cycling 2011–2020* mentioned equity as "an economically advantageous choice for individual citizens".
Hämäläinen et al., 2016 [115]	- HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; national/regional/local politically elected councils; contacts between public sector officers responsible for HEPA between levels; scientific advisory groups/institutes/individuals; intersectoral committees or working groups for HEPA; formal consultations on HEPA policy for stakeholders; public hearings for citizens. - There are no: field visits to make a policy; established systems of policymaking; steering committees; private sector involvement in policymaking; and administrative working groups including only public sector officers.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *On the Move, National Strategy for promoting health and wellbeing 2020* is available.
Tammelin et al., 2016 [201] [202]	**-** The assigned grade for the indicator *Government Strategies, Policies, and Investments* from *RC on PA for Children and Youth* is B. - *New Sport Act* (2015) regulates the aims related to PA at the national level. - The budget for improving sport and PA was 148M Euro in 2015, managed mainly by the Ministry of Education and Culture.
Kahlmeier et al., 2015 [127]	- The following national PA recommendations were identified: *Physical activity recommendations for 7 to 18 years of age* issued in 2008 by the Children and young people's physical activity expert group of the Young Finland Association; and *Early childhood education: physical activity recommendations* issued in 2005 by the Ministry

	of Social Affairs and Health, the Ministry of Education, and Young Finland Association. - Specific recommendations are provided for two age groups: less than 7 y.o. and 7-18 y.o. - The PA recommendations are not fully aligned with the WHO recommendations. - The *Physical activity recommendations for 7 to 18 years of age* include recommendations on muscle-strengthening activities and SB.
Bull et al., 2014 [85] [83] [84]	- The *Resolution concerning the development of health enhancing physical activity and diet* was published by the Government in 2008. - The national PA recommendations for children and youth were published in 2008. - At the governmental level, political commitment to HEPA promotion is excellent.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- Finland has an overall policy related to HEPA and sport promotion: Government resolution on policies promoting sport and physical activity and a its related action plan *Government resolution on policies promoting sport and physical activity*. Both documents were published in 2009 and in this study they were referred to as a single strategy - The strategy referred to the national policy/legislation framework including: the *Public Health Act* (2004); the *Sports Act* (1998); and the *Local Government Act* (1995). It highlighted that everybody should have equal opportunity to pursue way of life that includes sport, and that sport is a vital element of the individual and communal well-being. - The strategy mentioned that local authorities are accountable for the sports service structure.
Liukkonen et al., 2014 [145] Gråstén et al., 2014 [226]	**-** The assigned grade for the indicator *Government - Strategies, Policies, Investments* from *RC on PA for Children and Youth* is B. - *The Sport Act*, enacted in 1980, regulates PA aims at all levels. - The budget for improving sport and PA was €147M in 2013, managed by the Ministry of Education and Culture, focused mainly on PA promotion in elderly and children.
Kalman & Hamrik, 2013 [128] (in Czech language)	- In a policy document (name not specified) related to PA, a it is mentioned that healthy eating and the promotion of PA are aims implemented in many other documents and within a number of sectors. Ministries responsible for the sectors such as health, education, agriculture, economy, industry, transport, and communication should jointly collaborate on the promotion of PA, healthy nutrition, and general well-being.
Rütten et al., 2013 [185]	- The following public policies related to LTPA were identified: *Sport development Plan 2001-2010*; *Government resolution on policies to develop HEPA* (2002); *Sport Facility Management Direction 2011*; *Promoting pedestrian and bicycle traffic in Finland* (JALOIN, 2001-2004); *National Sport Facility Plan* (1979); and *Sports Act* (1980). - Supportive environments for LTPA (indoor/outdoor sport facilities, infrastructure for LTPA, and urban/green space for LTPA) are broadly available.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity are general and not quantifiable and measurable. - A document (details not specified) provided a thorough analysis of PA and eating habits of the population. - *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted, “partly different sets of actions within the designated areas of common priority”.
Brown et al., 2011 [43]	- The national policy document *Government resolution: On development of guidelines for health-enhancing physical activity and nutrition* was published by the Ministry of Social Affairs and Health in 2008.
World Health Organization, 2010 [12]	- The following national policy documents related to PA were identified: *Government resolution on development guidelines for health- enhancing physical activity and nutrition* (2008); *Physical activity and well-being in Finland in the 2010s* (2008); *Nordic Plan of Action on better health and quality of life through diet and physical activity* (2006); and *Promoting pedestrian and bicycle traffic in Finland, the JALOIN programme 2001–2004* (2005). - Since 2008, there has been a coordinating mechanism in the area of PA promotion. The leading institution has been the Council of Physical Activity Promotion. The participating stakeholders are government departments on sport, education and research, health, and transport.

Daugbjerg et al., 2009 [11]	- The policy document *Government Resolution on policies to develop health-enhancing physical activity* (2002) does not contain quantifiable PA goals, budget for policy implementation, and a requirement/intention for evaluation. The time frame is set from 2003 onwards.
World Health Organization, 2007 [227]	- The *Government Resolution on policies to develop health-enhancing physical activity in Finland* mentioned the establishment of HEPA Committee that was set up in 2002. It is linked with the Ministry of Social Affairs and Health and includes representatives from interest groups and other relevant ministries. - In 2001, the Ministry of Transport and Communication started promoting bicycle and pedestrian traffic through the *Jaloin programme*.
Cavill et al, 2006 [89]	- In 1990, National Sports Committee proposed a sports policy for 1990s . One of the main target areas was PA for fitness, recreation, and health among adults. - The programme *Fit for Life* started in 1995 and was active for the two following five-year periods. It is a major HEPA promotion programme that was based on the pilot programme *Finland on the Move*.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- *Sports Act* (1980, Ministry of Education), was the first relevant policy document that emphasised fitness, *sports for all*, and health and directed state subsidies to local authorities for the construction of sports areas. Its later version, published in 1999 highlighted the value of health benefits achieved by PA promotion, promotion of tolerance, equality and sustainable development.
Vuori et al., 2004 [10]	- In Finland, for more than 150 years health has been one of the major social values of sport - Since 1980, the health sector has held a strong position in relation to PA. The *Report of the Ministry to the parliament on health policy* (1985) and *Health for all by the Year* 2000 (1986) emphasised the importance of HEPA in daily environments. Therefore, key recommendations were to increase availability of cycling and walking paths and recreational areas. - *The Action Plan for Promoting Finnish Heart Health* (1997), published by the Ministry of Social Affairs and Health, emphasised PA as one of its key areas. It was a result of an extensive collaboration where public health institutions and NGOs showed interest in HEPA promotion.
Vuori et al., 1998 [211]	- Two national programmes, *Finland on the Move* and *Fit for Life*, have been successful in creating many new local PA promotion initiatives as well as in increasing PA levels of the population. Both programmes are based on scientific evidence. - *Fit for Life* programme focuses mainly on the target group of 40 to 60 years old adults.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There is a national policy for the promotion of PA or physical fitness. - One of the nationwide initiatives aims to increase the proportion of the active population of adults 40 to 60 years old, by 10% - Nationwide governmental action *Finland on the Move* aimed to organise local sport centres for PA promotion for the entire population.
France	
Prévot-Ledrich et al., 2016 [172] (in French language)	- There is no integrated national policy for HEPA promotion that would include all relevant components. - The current French public policies do not explicitly provide the necessary conditions for active lifestyles. - Multiple strategies have been used for PA promotion but they do not cover all sectors. - The *Health at Work Plan* does not include any specific HEPA measure.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Programme National Nutrition Sante 2011 - 2015.*
Vallgårda, 2015 [209]	- In 2010, *French Obesity Plan 2010-2013* was published by the Ministry of Social Affairs and Health. It stresses out that an increase in PA can be achieved by integrating goals from this plan into the urban policy.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Physical activity and health: scientific arguments, practical approaches,* issued in 2001. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for

	adults. - The document does not include recommendations on SB.
Rütten et al., 2013 [185]	- The following public policies related to LTPA were identified: the *National plan on prevention through physical activity and sport* (2008) and the *Second National Plan Health-Environment 2009-2012,* and *National Nutritional Health Programme 2011-2015.* - "Sport for All" development, especially for those from deprived areas and for young women, is supported by the National Centre for the Development of Sport. - Supportive environments for LTPA (indoor/outdoor sport facilities, infrastructure for LTPA, and urban/green space usable for LTPA) are broadly available.
Ceccarelli et al., 2011 [90]	- The following quantifiable target related to PA is stated in the analysed policy document (details not specified): 25% of the population should accumulate at least 30 minutes of PA per day, five days a week.
World Health Organization, 2010 [12]	- The following national policy documents related to PA were identified: *Nutrition and physical activity in schools* (2009); *Charter to promote healthy diet and physical activity in television programmes* (2009); *Second national action plan environment and health 2009– 2013* (2009); *National plan on disease prevention through physical activity and sport* (2008); *Second national programme on nutrition and health 2006–2010* (2006); N*ational Plan on Healthy Ageing 2007–2009* (2005); *Sedentariness and physical inactivity* (2003); and *National programme for nutrition and health 2001–2005* (2001) - Since 2001, there has been a coordinating mechanism in the area of PA promotion, with the leading institution being the Ministry of Health and Sports. The participating stakeholders are: government departments on food, health, agriculture, trade and economy, education and research, finance, sport, consumer affairs, and social welfare; communities; academia; civil society; the private sector; and NGOs.
Bréchat et al., 2009 [82] (in French language)	- 14 national programmes based on the rationale that PA and sport are important factors for public health were drafted and implemented between 2001 and 2006. - The "success conditions" of each national action were identified and they were classified according to their potential efficacy for increasing PA. The three actions with the best scores were: national plan *Ageing well*; *The inter-regional programme for consultation on seniors' physical aptitude (Pi-CAPs)*; and the *Programme for the promotion of health through sport and PA and prevention of doping behaviours* (PN-APSD).
World Health Organization, 2007 [227]	- *La santé vient en bougeant* (2004) are complementary guidelines on PA tailored to specific target groups. - *J'aime manger, j'aime bouger* (2004) are separate guidelines addressing both PA and nutrition, and they target adolescents only.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. France has some nationwide programmes for the promotion of physically active lifestyles, and they have a narrow scope.
French Polynesia	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Georgia	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Decree of Government # 2 of II January 2017 regarding National strategy for NCD Prevention and Control plan for years 2017-2020.*
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Lachat et al., 2013 [140]	- In 2006, the Ministry of Labour, Health and Social Affairs—Public Health Department issued *Food security, healthy eating & physical activity national policy*. - National policy includes the following targets and actions for PA promotion: ensure that the nationwide promotion of social, health, and economic PA benefits is evidence-based; enable public use of the facilities for school sport; design environment suitable for PA; develop policy and legislation for PA promotion at the local level; health sector should take a key role in the decision making process by creating networks with stakeholders and relevant sectors; allocate a part of sports funds to PA promotion; and policy related to urban planning should include secure cycling and walking routes, a plan for stadia, and a plan for recreational facilities. - The policy included detailed actions and specified implementation plan for the

	stakeholders.
Branca et al., 2007 [80]	- A policy document entitled *Food security, healthy eating and physical activity. National Policy, Food and Nutrition Action Plan for Georgia 2006–2010* was published in 2006 by the Ministry of Labour, Health and Social Affairs.
World Health Organization, 2007 [227]	- The action plan related to healthy eating, PA and for security (2006) aims to: promote PA; create monitoring systems for nutrition, PA, and food security; and cooperate with international organisations regarding healthy eating, PA, and food safety.
Germany	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *INFORM - Germany's national initiative to promote healthy diets and physical activity* is available.
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Vallgårda, 2015 [209]	- *IN FORM - German National Initiative to Promote Healthy Diets and Physical Activity. The National Action Plan for the prevention of Poor Dietary Habits, Lack of Physical Activity and Related Diseases* was issued in 2008 by the Ministry of Food, Agriculture, and Consumer protection and the Ministry of Health. It aims to provide special support and attention to families with a migrant background and socially disadvantaged families. - The plan aims to govern, but at the same time it allows people to decide for themselves.
Rütten et al., 2013 [185]	- The following public policies related to LTPA were identified: *National Action Plan on Nutrition and Physical Activity* (2008) and *National Cycling Strategy 2002-2012.* - Federal government assigns a stronger role for PA and sport promotion to the states (*Bundesländer*) and the local administration. - Supportive environments for LTPA (indoor/outdoor sport facilities, infrastructure for LTPA, and urban/green space for LTPA) are broadly available.
World Health Organization, 2011 [231]	- The document *German national initiative to promote healthy diets and physical activity* combines PA and diet and sport is addressed as a subtopic.
World Health Organization, 2010 [229]	- The *IN FORM* initiative has a goal to promote PA and healthy diet. It refers to the action plan on the lack of PA, prevention of poor dietary habits, overweight, and related chronic diseases. The action plan ensured networking and collaboration between the health-care system, policy-makers, businesses, civil society, actors in the social field, and the media.
World Health Organization, 2010 [230]	- The Federal Government outlined children's health promotion as a priority issue. The Ministry of Health issued a strategy entitled *Strategie der Bundesregierung zur Förderung der Kindergesundheit* in 2008. The strategy mentions initiatives and activities related to children's PA, mental health, injury prevention, environmental health, and well-being. A special focus is on children with a migrant background and/or socially disadvantaged children. - In 2004, the Government established the platform *Nutrition and physical activity* to promote healthy nutrition and PA and encourage people to fight against obesity.
World Health Organization, 2010 [12]	- The following national policy documents related to PA were identified: *IN FORM – Germany's initiative for a healthy nutrition and more physical activity* (2008); *National Strategy for the Promotion of Child Health* (2008); *National action plan for a child-friendly Germany 2005–2010* (2005); and *National Cycling Plan 2002–2012 "Ride your bike!*" (2002). - Since 2007, there has been a coordinating mechanism in the area of PA promotion. The leading institutions have been the Federal Ministry of Health and the Federal Ministry of Food, Agriculture, and Consumer Protection as leading institutions. The participating stakeholders are: government departments on agriculture, labour, transport, culture, social welfare, education and research, health, consumer affairs, sport, food, and urban planning; communities; academia; civil society; the private sector; and NGOs.
Daugbjerg et al., 2009 [11]	- The policy document *National Cycling Plan 2002-2012 "Ride your bike!"* (2002) does not contain quantifiable PA goals and a budget for policy implementation, but it contains a requirement/intention for evaluation.
Bergsgard et al., 2007 [76]	- "Sport for All", mass sport, was well established by the late 1970s but it is mainly the responsibility of local/state (*Bundesländer*) level governments and not national, that is federal level government. At the national level, the key initiatives are undertaken by the national sports federations and not by the Government.

	- The “national federal ministries” provide funding to the *German Sport Confederation* to deliver programmes related, for example, to women’s sports, family sports, sports for elderly, and the integration of minority groups in sports.
World Health Organization, 2007 [227]	- The German Platform for Diet and Physical Activity, was established in 2004 and is a good example of integrating and mobilising stakeholders from different groups such as government representatives, scientific organisation, trade unions, sports unions, parents’ organisations, food industry, health insurance associations, and food producers. - The Federal Ministry of Transport, Building, and Housing issued the *National cycling plan 2002–2012 – ride your bike*! to promote cycling in Germany.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. There is no clear picture regarding nationwide activities for the promotion of physically active lifestyle.
Ghana	
Ocansey et al., 2016 [164]	- The assigned grade for the indicator *Government – Strategies, Policies, Investments* from *RC on PA for Children and Youth* is D. - There is no official policy by the Ministry of Education on school sport and PE. There is only syllabi and requirements for the participation in PE. - No national recommendations/guidelines for built environment to promote PA in youth and children are available.
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Ocansey et al., 2014 [163]	- The assigned grade for the indicator *Government – Strategies, Policies, Investments* from *RC on PA for Children and Youth* is D. - There is no policy on after-school sport, although national school sport events and festivals are organised biannually. - Policies related to PA should be developed.
Lachat et al., 2013 [140]	- In 2007, The Ministry of Health issued *National health policy: creating wealth through health*. - National policy includes the following targets and actions for PA promotion: let PA education become obligatory in schools; and encourage regular exercise.
Greece	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2010 [12]	- National policy has not yet been developed. - There is no coordinating mechanism in the area of PA promotion.
Matalas in Simonopoulos (ed.), 1997 [152]	- The Government introduced PE as an obligatory subject in schools in 1899 (*Themidos Code*) - The Office for the Development of Sports, Ministry of Culture, founded in 1985, had a key mission to promote *Sports for All*. Some of the sports for all programmes implemented between 1991 and 1993 include programmes for children, young people, women, men in the military service, people with special needs, addicts, and prisoners.
Greenland	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Inuuneritta 2013-2019.*
Ceccarelli et al., 2011 [90]	- *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted “partly different sets of actions within the designated areas of common priority”.
Grenada	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Guam	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Guam NCD Strategic Plan 2014 – 2018.*

Guatemala	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *2008 - 2012 Action Plan for the Prevention and Integral Control of Chronic Diseases and Risk Factors.*
Lachat et al., 2013 [140]	- National policy includes the (details not specified) following targets and actions for PA promotion: apply measures and strategies that support good health and include PA, particularly in schools and at worksites; and organise multisectoral workshops for the development of national and local PA networks.
Guyana	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic plan for the integrated prevention and control of chronic non-communicable diseases and their risk factors 2013-2020.*
Lachat et al., 2013 [140]	- In 2008, the Ministry of Health issued the *National health sector strategy*. - National policy includes the following targets and actions for PA promotion: promote PA in schools and communities; by 2010 make PA an examinable subject in all schools. - The policy includes strategies for PA promotion focused on workplaces.
Haiti	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Hong Kong SAR, China	
Huang et al., 2016 [124] [125]	- The indicator *Government - Strategies, Policies, Investments* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete. - The Leisure and Cultural Services Department is responsible for sport and recreation. In the local community it has promoted “Sport for All” and organised School Sports Programmes for students to engage in sport activities during leisure time. - Department of Health issued the *Physical Activity Guide for Children Aged 2 to 6* (2011) and the *Report of Advisory Group on Health Effects of Use of Internet and Electronic Screen Products* (2014). The report stated that children (2-6 y.o.) should limit screen time to maximum two hours per day and avoid sitting for more than one hour. Six to twelve years old children should limit their recreational screen time to maximum two hours per day. For youth from 12 to 18 years old, it is recommended to avoid prolonged screen time. There is limited awareness on guidelines related to SB among the relevant stakeholders.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Action Plan to Promote Healthy Diet and Physical Activity Participation in Hong Kong* is available.
Hungary	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the documents entitled *National Sport Strategy 2007 -2020. National Old-age Policy (Strategy) (2009), Semmelweis Plan for the Rescue of Health Care (2011).*
Kahlmeier et al., 2015 [127]	- It is reported that national PA recommendations exist, but no other details are available.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The document *Sport XXI. National sports strategy 2007–2020 [Sport XXI. Nemzeti sportstrategia 2007–2020],* issued in 2007, included people with disabilities as a target group. It mentions the emphasis needs to be put on leisure sport for people with disabilities.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity. - The quantifiable targets reported in the analysed policy document (details not specified) are: increase the number of people by 15% who participate in sport as intensively and as long as it is deemed necessary from the physiological perspective, and increase at least by 25% the level of exercise of those people who are not sufficiently active.
World Health Organization, 2010 [12]	- The following national policy documents related to PA were identified: *National Youth Strategy 2009-2024* (2009); *National Sport Strategy, Parliament Resolution* (2007); *Parliamentary Resolution 47/2007 (V31) OGY on the National Strategy 2003 – 2032 to improve the situation of children* (2007); *Cycling Hungary Programme 2007 – 2013* (2007); *“Johan Bela” National Programme for the Decade of Health* (2003); and *Act on Public Education* (1993).

	- There has been a coordinating mechanism in the area of PA promotion, with the Ministry of Local Government as the leading institution. The participating stakeholders are government departments on sport, health, and transport; civil society; and NGOs.
Daugbjerg et al., 2009 [11]	- The policy document *Johan Bela'—National Programme for the Decade of Health*, issued in 2003, contains quantifiable PA goals, but it does not contain a budget for policy implementation and a requirement/intention for evaluation. - The document *National Public Health Programme—Action Plan*, issued in 2004, does not contain quantifiable goals, budget, and an evaluation requirement/intention.
Branca et al., 2007 [80]	- The Ministry of Health, Social and Family Affairs issued the *"Johan Bela" National Programme for the Decade of Health* in 2003 and the *National Public Health Programme – Summary* in 2004.
Iceland	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Recommendations for physical activity,* issued in 2008. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people, adults, and older adults. - The document includes recommendations on inactivity for children/young people, adults, and older adults and on screen-time for children/young people.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the WHO Global Strategy on Diet, Physical activity and Health or to some other document assessing the problem of obesity. - The document includes a thorough analysis of PA and eating habits of the population. The time frame for achieving goals is ten years. - The quantifiable goals mentioned in the policy document are the following: achieve at least 30 minutes of MVPA every day for adults; and achieve at least 60 minutes of MVPA daily for children and adolescents. - *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted, "partly different sets of actions within the designated areas of common priority".
Daugbjerg et al., 2009 [11]	- Policy documents *The Icelandic National Health Plan to the year 2010—abridged version* (2001) and *The National Health Promotion Strategy 2000-2005* do not contain quantifiable PA goals and budget for policy implementation but contain a requirement/intention for evaluation.
World Health Organization, 2007 [227]	- *The National health plan to the year 2010*, issued in 2001, emphasised the importance of a healthy lifestyle, especially addressing PA and exercise for people of all age groups. - In 2003, the Public Health Institute of Iceland was established and one of its key focus areas is health promotion through proper nutrition and PA. - In 2005, the Parliament passed a resolution that calls for action to improve population's health through increased PA and healthier diet. - A working group was established by the Minister of Education, Science, and Culture in 2005, with a goal to create a sports policy. They issued *The progress report, Sporty Iceland* in 2006. A formal sport policy document is under development. Its key emphasis is put on the significance of daily exercise and how society can develop a forum for a healthy lifestyle.
India	
Katapally et al., [130] [131]	- The assigned grade for the indicator *Government – Strategies, Policies, and Investments* from *RC on PA for Children and Youth* is D. - Several policy documents on PA promotion including PA guidelines have been issued by the Government, but there is no clear evidence of their implementation. - There is a lack of policies related to active living urban planning for enhancement of walkability. - Most government's strategies are focused on competitive/elite sport.

Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Lachat et al., 2013 [140]	- In 2008, India Planning Commission Government issued *Eleventh five-year plan: 2007–12*. - National policy includes the following targets and actions for PA promotion: build sport infrastructure at grassroots level in urban and rural parts; incorporate PE into the school system; modify sports policy, services, and action plan; and involve the corporate sector in the establishment of the sport culture. - The policy included concrete actions for the involvement of the private sector in PA promotion. - The policy targeted community at large.
Indonesia	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Lachat et al., 2013 [140]	- In 2005, Indonesia National Development Planning Board, issued the *National action plan for food and nutrition 2006–2010*. - National policy includes the following targets and actions for PA promotion: increase PA at the population level by increasing promotion efforts; in the frame of building public awareness at all levels of society, enhance understanding of PA benefits; increase funding and the number of open space and sport facilities. - The policy targeted community at large.
Iran, Islamic Rep.	
Lachat et al., 2013 [140]	- In 2010, the Iranian Ministry of Health and Medical Education—Nutrition Department issued the *Operational plan to improve community nutrition*. - The policy stated that students' obesity and overweight should be controlled and prevented by increasing PA.
World Health Organization, 2014 [232]	- There is a national coordinating committee for population PA. - National action plan and policy related to PA are under development (details not specified). - Besides the general population, the population groups that are covered in national policy documents (under development) are: children and young people; older adults; workforce/employees; women; clinical population with chronic disease; low socioeconomic groups; and families. - The settings covered by national policy documents (under development) are: primary schools; high schools; primary health care; clinical health care; workplaces; senior/older adult services; sport and leisure; transport; environment; and urban design/planning.
Iraq	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Non-Communicable Diseases and Mental Health Control and Prevention Programme.*
World Health Organization, 2014 [232]	- There are national NCD strategic plans or policies that include goals focused on PA (details not specified). - No specific target groups are mentioned, only general population is covered in national policy documents. - The settings covered by national policy documents are: primary schools; primary health care; sport and leisure; and transport.
Ireland	
Harrington et al., 2016 [120] [121]	- The indicator *Government* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete. - Multisectoral promotion of PA in children through the education, health, sport, and transport sectors is highlighted in strategy and policy documents - *Get Ireland active! National Physical Activity Plan for Ireland*, issued in 2016 by the Department of Health and the Department of Transport, is innovative, because it sets out 60 actions and identifies lead agencies and responsible partners and the timeline for its delivery. - The reduction of SB and its replacement with PA is recommended in *Get Ireland Active! The National Guidelines on Physical Activity for Ireland* issued in 2009 by the Department of Health and Children.
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.

Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *The National Guidelines on Physical Activity for Ireland,* issued in 2009. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people and older adults. - The document does not include recommendations on SB.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- Two documents were published in 2008: *Building sports for life: the next phase – the Irish Sports Council's strategy 2009–2011* (an action plan) and the *Statement of Strategy 2008–2010* (Department of Arts, Sport and Tourism). In this study, the two policy documents were referred to as a single strategy - The strategy mentioned that both external and internal consultations took place involving government agencies, boards, key sectors, and the public.
Harrington et al., 2014 [118] [119]	- The indicator *Government* from *RC on PA for Children and Youth* did not receive a grade. It was marked incomplete. - There are no specific PA targets/goals and no national PA plan. - Policy documents related to active travel are the following*: Ireland's First National Cycle Policy Framework 2009-2020*; and *Smarter Travel – A Sustainable Transport Future A New Transport Policy for Ireland 2009 – 2020.*
Kalman & Hamrik, 2013 [128] (in Czech language)	- In a policy document (details not specified) related to PA it is mentioned as a problem that 42% of people are engaged in some form of PA but the percentage is reducing with increase in age. Almost 1/3 of people older than 55 are not engaged in any weekly PA.
Woods & Mutrie, 2012 [218]	- National PA policy does not exist, that is clear national vision with strategic plan, resources, clear PA goal or evaluation mechanisms. - In 2010, Health Service Executive set up working group to provide draft of the national PA plan.
Brown et al., 2011 [43]	- *The National Guidelines on Physical Activity for Ireland*, published by the Department of Health and Children Health Service Executive in 2009 were not recommended according to the Appraisal of Guidelines for Research and Evaluation quality grading (AGREE tool).
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity. - The quantifiable goals in the policy document for the next 15 years and over are the following: increase the number of people who engage in accumulated 30 minutes of light physical exercise throughout most days of the week by 30%; and increased the number of people who engage in moderate physical exercise at least 20 minutes three times a week by 20%.
World Health Organization, 2010 [230]	- In 2000, the Department of Health and Children issued *The national children's strategy: our children – their lives* that, a ten-year policy framework. One of the objectives of the framework is that all children gain access to sport, play, cultural activities, and recreation, to enrich their childhood. - Another important policy documents is *Ready, steady, play! A national play policy*, issued by the National Children's Office in 2004. - *Teenspace: national recreation policy for young people* issued in 2007 by the Office of Minister for Children set several objectives, including giving young people a voice in the implementation, design, and monitoring of recreation facilities and policies.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National Men's Health Policy* (2008) and *The National Health Promotion Strategy 2000–2005* (2000). - Since 2009, there has been a coordinating mechanism in the area of PA promotion, with Department of Health and Children as the leading institution. The participating stakeholders are: government departments for culture, health, transport, trade and economy, agriculture, sport, urban planning, labour, social welfare, food, education, and research; academia; NGOs; and the private sector.
Branca et al., 2007 [80]	- The following national policy documents were identified: *Obesity: the policy challenges*. *The report of the National Taskforce on Obesity* (2005) and *The National Health Promotion Strategy 2000–2005* (2000). Both documents were issued by the Department of Health and Children.

World Health Organization, 2007 [227]	- Issues around nutrition and PA promotion are mentioned in the *National health promotion strategy 2000–2005*. - The Department of Arts, Sports, and Tourism, established in 2002, had the objective to promote sport especially in disadvantaged areas and create sustainable facilities.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness.
Israel	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Healthy Israeli 2020 Initiative.*
Kranzler et al., 2013 [137]	- Working groups of the *Healthy Israel 2020* initiative related to PA, nutrition, and obesity suggested policy guidelines and goals. That was the first stage in the development of the *National Programme to Promote Active, Healthy Lifestyle* that was launched in 2010. It represents a paradigm shift for the Israel Ministry of Health, become health promotion was previously marginalised when compared to some other areas the Ministry focused on. - The Programme sets the following quantifiable targets: increase the number of those who engage in the recommended amount of PA by 20% among Jewish boys and by 35% among Jewish and Arab girls and Arab boys; decrease the number of children who watch television two or more hours per day by 20%; and increase the number of those who engage in the recommended amount of PA by 30% among Arab women, by 20% among Jewish men; and 25% among Jewish women and Arab men. - Some PA promotion initiatives include: website by the Ministry of Health and Education that contains games and other activities to make children excited about the healthy and active lifestyle; training for nurses on education of parents to encourage children to be more active and eat better; a pilot programme for the promotion of health at workplaces that will be launched in 2013 by the Ministry of Health. - In 2012, the Ministry of Culture and Sport conducted *The First National Survey of Physical* *Activity in Israel.*
World Health Organization, 2007 [227]	- In 2005, the Health Promotion Council, Ministry of Health established the Obesity Task Force and the Physical Activity Task Force.
Italy	
Hämäläinen et al., 2016 [115]	- A national project for the promotion of PA was based on the policy *Gaining Health* issued in 2007 by the Ministry of Health. - HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; national/regional/local politically elected councils; contacts between public sector officers responsible for HEPA between levels; private sector involvement in policymaking; and public hearings for citizens. - There are no: field visits to make a policy; established systems of policymaking; intersectoral committees or working groups for HEPA; scientific advisory groups/institutes/individuals; steering committees; administrative working groups including only public sector officers; and formal consultations on HEPA policy for stakeholders. - The overall coordination features for HEPA policies are: rather decentralised, strong individuals, network arrangements, and private sector involvement.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Gaining health.*
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Bull et al., 2014 [85] [83] [84]	- Within the *Gaining Health Programme*, launched in 2008, a three year (2007-2010) national project on PA promotion was carried out. The project was called *Promoting Physical Activity – Actions for a Healthy Life* - *National Prevention Plan 2010 – 2012* includes the reduction of obesity and the promotion of a healthy style as public health priorities. - Sport development and management are the responsibility of the Italian National Olympic Committee. The Ministry of Health (General Directorate of Prevention, Healthy Lifestyle Unit and Public Health and Innovation Department) is responsible for HEPA promotion. - The key law related to PA and sport in schools is *Decree 18/12/1975*

	- National PA recommendations do not exist. - There are no national goals for PA.
Ceccarelli et al., 2011 [90]	- The identified goals in policies (details not specified) that deal with nutrition, PA, and obesity are general and not quantifiable and measurable. - The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Gaining health* (2007), the *National plan for prevention 2005-2007* (2005) and the *National Health plan 2003-2005* (2003) - There is no coordinating mechanism in the area of PA promotion.
World Health Organization, 2007 [227]	- In 2005, the Ministry of Health issued a *National Plan of Prevention 2005–2007.* Its key priority is to fight against obesity, especially in children. Some of the initiatives include: the promotion of PA in the community and developing urban environments that support PA.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness.
Jamaica	
Lachat et al., 2013 [140]	- In 2004, the Ministry of Health issued the *National policy for the promotion of healthy lifestyles in Jamaica*. - National policy includes the following targets and actions for PA promotion: provide green, secure, and clean open space for everyone to participate in PA; establish healthy communities that are suitable for community members to engage in PA; in four years, increase the number of people having moderate PA levels by 40%; establish partnership with media for PA promotion; create life-skills programme for communities, schools, and worksites that includes PA and all aspects of healthy lifestyle; create guidelines on sports and PE for target groups; improve and evaluate facilities for including PA in health service; involve PA as part of chronic disease management; establish laws, regulations, and policies that encourage PA lifestyle and supportive environment in workplaces, communities, and schools; and provide opportunities for young people and children to engage in supervised afterschool sport activities. - The policy includes concrete actions for involvement of private sector in PA promotion.
Japan	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Health Japan 2.*
Tanaka et al., 2016 [204] [205]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is B. - There are no national recommendations for SB. - Relevant government documents include: *The School Lunch Programme Act*; *the School Health and Safety Act*; *the Basic Act on Sport*; the *Community Health Act*; *Health Promotion Law*; *the Maternal and Child Health Act*; *the Basic Act on Food Education*; *Healthy Parents and Children 21*; the *Sport Basic Plan*; and *Health Japan 21.* - The current PA guidelines are only available for elderly, adults, primary school children, and preschool children. There are no guidelines for adolescents. - The *Sports Authority*, an external organ of the Ministry of Education, Culture, Sports, Science, and Technology and the Ministry of Health, Labour, and Welfare are responsible for policies related to PA, exercise, and sports. - The National Budget for Sports and the Sports Promotion Lottery are responsible for the investment and implementation of the national policy.
Ceccarelli et al., 2011 [90]	- The identified goals in policies (details not specified) that deal with nutrition, PA, and obesity are general and not quantifiable and measurable. - The analysed policy document (details not specified) does not specify a time frame to reach the targets.
Pate et al., 2011 [37]	- Policy related to PE in schools states that: children should engage in at least two hours of PE a week; PE should be taught by highly qualified and certified teachers; and PE curriculum should be included in the school review process.

	- PA policy within the area of health education states that: cooperation with universities should be established to provide teacher education classes for inclusion of the *PA and Health* topic into the curriculum; training in motivational interviewing techniques related to PA should be provided to healthcare professionals in schools; the promotion of PA for achieving health benefits should be incorporated in health education classes; education should be provided to parents to encourage them to regularly engage in PA and to be positive role models for their children. - The data were extracted from the *Basic Plan for the Promotion of Sports 2001 – 2010* issued by the Ministry of Education, Culture, Sports, Science and Technology.
Koh, 2010 [136] (in Korean language)	- The Ministry of Health, Labour, and Welfare of Japan issued the *Exercise and physical activity guide for health promotion* in 2006. The document provides PA recommendations by stages of behaviour change. - The National Institute of Health and Nutrition issued *Exercise and Physical Activity Reference for Health Promotion* in 2006. The document differentiates between moderate or high-intensity exercise (e.g. jogging, swimming, tennis, brisk walking) and low-intensity exercise (e.g. stretching) and also between moderate or high-intensity non-exercise activity (e.g. cleaning floors, washing car, gardening, walking.) and low-intensity non-exercise activity (e.g. standing, doing laundry cooking, playing piano).
Jordan	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National Strategy And Plan Of Action Diabetes, Hypertension, Dyslipidaemia And Obesity in Jordan.*
World Health Organization, 2014 [232]	- A national coordinating committee related to PA was established, but it no longer exists.
Lachat et al., 2013 [140]	- In 2006, the Ministry of Health, issued the *Nutrition in Jordan: update and plan of action*. - National policy includes the following targets and actions for PA promotion: establish multisectoral committee for PA and develop national strategy for the promotion of PA and exercise.
Kazakhstan	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2007 [227]	- *2010 Health Promotion* is a strategic document that has eight priority areas. One of them is focused on PA and nutrition. The strategy states that the responsibility for action should be put on individuals, government, and employers. - An interdepartmental document related to healthy lifestyles was developed in 1999. Implementation should take place in three phases, from which the first two are committed to setting up a network for NCD prevention at the local, regional, and national level, focusing on PA and nutrition through special training programmes.
Kenya	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Kenya Health Policy 2014-2030.*
Lachat et al., 2013 [140]	- In 2013, the Ministry of Public Health and Sanitation issued the *National nutrition action plan 2012–2017*. - National policy (details not specified) included the following targets and actions for PA promotion: by 2016/17 the number of people that have a healthy diet and engage in PA should be 15%; educate health workers on PA; and in all counties arrange “sensitisation” meetings on PA.
Onywera et al. 2016 [165] [166]	- The assigned grade for the indicator *Government and Nongovernment (Strategies, Policies, Investments)* from *RC on PA for Children and Youth* is D. - *National Plan of Action for Children*, published by the National Council for Children’s Services in 2015,recognises the right of all children to plan, leisure and recreation. - There are no known governmental tactics to tackle built environment and its impact on PA in children.
Wachira et al., 2014 [212] [213]	- The assigned grade for the indicator *Government and Nongovernment (Strategies, Policies, Investments)* from *RC on PA for Children and Youth* is C. - There are several policies that target some of the core indicators related to PA, but

	there is a lack of their implementation. - There are no PA or SB guidelines, national surveillance plan, and PA or active healthy living strategy. - The Ministry of Education mentions the amount of time per week that youth and children are required to participate in PE.
Kiribati	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Korea, Rep.	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *The physical activity Guide for Koreans* is available.
Yoonkyung et al., 2016 [221] [222]	- The assigned grade for the indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* is C. - Evidence-based PA and SB guidelines should be developed. - The Ministry of Education promotes PA through *School Sports Activation Project* (elementary school: at least three PE classes/week, middle school: at least 4 PE classes/week, high school: ten PE classes during six semesters). It has also expanded the *School Sport Club programme*, initially launched in 2007. The goals are: to increase participation of students in school sports clubs to 17 or more hours per year; to improve facilities (particularly for girls and younger children); and to increase the proportion of qualified instructors. - The *Integrated Sports Council* was founded by the Ministry of Culture, Sport, and Tourism, the Korea Council of Sports for All, the Ministry of Education, the School Union, the Korea Institute of Sports Science, and the Korean Olympic Committee. They all jointly work on PA promotion.
Ceccarelli et al., 2011 [90]	- The quantifiable targets mentioned in the analysed policy document (details not specified) are: in 2020 increase by 30% the rate of participation in MVPA for 30 minutes a day, five days a week.
Koh, 2010 [136] (in Korean language)	- *Medical Law of Republic of Korea. No. 9386. Article 2* states that physicians have a responsibility to promote national health and contribute to securing people's healthy lives. They have the duty of "health guidance". Therefore, the authors suggest the development of "official" PA guidelines at the national level, with a high level of inclusion of the medical service industry in the process. The guidelines should be developed according to the Transtheoretical model of behaviour change. - Article 2 of the *National Sports Promotion Act* in Korea defined sport as "activities to cultivate a healthy mind and body through PA to make good use of leisure time". "Sport for All" was defined as "sport activities conducted voluntarily in daily life for the promotion of health and fitness".
Kuwait	
World Health Organization, 2014 [232]	- There is a national coordinating committee for PA. - International recommendations and guidelines on PA are used instead of national ones. - The adoption of the global recommendations has been recommended in the draft of the national policy (details not specified). The adoption by the Government is pending. - National policy documents cover: the general population; children and young people; older adults; workforce/employees; women; the clinical population with chronic diseases; sedentary/the most inactive; low socioeconomic groups; and families. - Settings covered by national policy documents that have not yet been adopted: kindergarten; primary schools; high schools; colleges/universities; primary health care; clinical health care; workplace; senior/older adult services; sport and leisure; transport; environment; urban design/planning; desert; cooperative societies; and *dewaniya*.

Ramadan et al., 2010 [175]	- In 2007, the National Physical Activity Committee was established. It included: representatives from the Ministry of Health, Governorates, and NGOs; PA specialists; cardiologists and other physicians; Parliament members; prominent media figures; and university presidents and deans. - The *National Physical Activity Plan* is in the process of development and its key objectives are to: increase the awareness of the importance of PA for improving quality of life and health; contribute to follow-up, prediction, and monitoring of health conditions related to physical inactivity; encourage and inspire community members to regularly participate in PA and use opportunities available for PA participation; build a capacity for PA promotion by conducting workshops and hosting scientific meetings; develop worksite and school policies that will result in increased PA; contribute to the reduction of behavioural and social problems (e.g. alcohol and drug use) by encouraging LTPA; develop built environment policies that will enable people to be more active; decrease the physical inactivity prevalence each year; design and disseminate an example for other countries in the Region.
Kyrgyz Republic	
World Health Organization, 2010 [229]	- Policy documents in the PA area not yet available.
Latvia	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The document related to sport promotion entitled *National sports development programme 2006–2012* [Nacionala sporta attistibas programma 2006–2012] was issued in 2006. It mentioned short-term, medium-term, and long-term time frames. Within the time frame of six years, four main targets were determined for each year of the programme. The key result of the programme implementation should be: an increased number of people engaged in PA; a decline in physical inactivity indicators; and an improvement in the society's health in general.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National sports development programme* 2006–2012 (2006); *Sport policy guidelines 2004–2009* (2004); and *Public Health Strategy* (2001). - Since 2003, there has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the Ministry of Education and Science. The participating stakeholders are government departments on finance, health, welfare and education; academia; and NGOs.
World Health Organization, 2007 [227]	- The documents *Public health strategy* (approved in 2001) and *the Healthy nutrition 2003–2013 – concept of the Cabinet of Ministers* mentioned the need to keep the public informed on healthy lifestyles, nutrition, PA, and food hygiene.
Lao PDR	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Lebanon	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Lithuania	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *2011 – 2020 State Sport Development Strategy* is available.
Kahlmeier et al., 2015 [127]	- National PA recommendations were reported to exist, but no other details are available.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The document related to sport promotion entitled *The physical education and sports strategy 2005–2015* [Lietuvos Respublikos kuno kulturos ir sporto strategija 2005–2015 metams] was issued in 2005. It addressed sport and PE in preschool, primary, and secondary school children, and in university students. For all of the groups, specific sets of objectives were mentioned.
Rütten et al., 2013 [185]	- Public policy related to LTPA *National Sport Development Strategy, 2011-2020* was issued in 2011. This policy is criticised for lacking the principles established in the WHO recommendations and EU PA Guidelines. - Supportive environments for LTPA (indoor/outdoor sport facilities and urban/green space usable for LTPA) are partially available.

World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *State Physical Education and Sport Strategy* (draft) (2010) and *Law on Physical Education and Sports* (2008). - Since 2002, there has been a coordinating mechanism in the area of PA promotion. The leading institutions have been the Ministry of Health, the Ministry of Interior, and the Department on Physical Education and Sports. The participating stakeholders are government departments on urban planning, food, health, sport, social welfare, and education and research; "Sport for All" Association; NGOs; academia; media; communities; and civil society.
World Health Organization, 2007 [227]	- The *State food and nutrition strategy and action plan 2003–2010* was issued in 2003. Some of the measures to reach the targets of the action plan are: the implementation of law on sports and PA; and an obesity control programme at the national level. - National legislation specifies PE in school must be held at least three hours per week.
Luxemburg	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Action plan for the promotion of healthy nutrition and physical activity* is available.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Towards a national plan for healthy nutrition and physical activity,* issued in 2007. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people and adults. - The document does not include recommendations on SB.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity (details not specified) are general and not quantifiable and measurable. - The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity.
World Health Organization, 2010 [12]	- The *Action plan for human-powered mobility* was issued in 2008 by the Ministry of Transport, the Ministry of Public Works, and the Ministry of Interior and Spatial Planning. - The *Action plan for the promotion of healthy nutrition and physical activity* was issued by the Ministry of Education, the Ministry of Health, the Ministry of Family and Integration, and the Ministry of Sports. - Since 2007, there has been a coordinating mechanism in the area of PA promotion. The leading institutions are the Ministry of Health and the Ministry of Sport. The participating stakeholders are: government departments on food, health, urban planning, education, sport, research, and social welfare; academia; communities; media; civil society; and NGOs.
World Health Organization, 2007 [227]	- A national interdisciplinary coordination body will be established to implement the action plan *Eat healthy, move more*. It will assess the aims, identify further needs, and perform regular modifications of the programme on PA and nutrition. - After the first National Health Conference (held in 2005), the Ministry of Health took initiative to develop a national programme for the promotion of PA and healthy nutrition. - Four ministries (education, sport, health, and family) are jointly working on developing a common policy and action plan related to PA and nutrition. Some of the key goals are to: increase the quality and quantity of PA at the population level and raise the awareness of a healthy lifestyle promoting mental, social, and physical health. Special focus will be put on children and youth.
Macao SAR, China	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Macedonia, FYR	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Development of comprehensive plan for creating healthy municipalities through physical activity in urban environment* is available.
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Lachat et al., 2013 [140]	- The *Second action plan on food and nutrition in the Republic of Macedonia for 2009–2014* was issued in 2009.

	- The national policy includes the following targets and actions for PA promotion: enhance possibility of PA through its everyday life integration (e.g. workplace, school, and kindergartens); provide support to local authorities to remove barriers for active transportation and build recreational infrastructure; and ensure that "recommendations for proper nutrition are always followed by recommendations for PA".
World Health Organization, 2010 [229]	- Campaign *Health for All* was launched by the Government in 2007. It offered free counselling on PA and healthy diet and preventive health check-ups for those of 20+years of age .
Madagascar	
Lachat et al., 2013 [140]	- National policy target/action (details not specified) is to develop NCDs prevention policy that includes PA recommendations.
Malaysia	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Sharif et al., 2016 [193] [194]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is B. - There is no specific PA policy, but various strategies for PA promotion in children and adolescents are mentioned in the following policy documents: a) The *National Sports Policy* (2009), with main objectives to develop sports culture, promote sort and PA participation through High Performance Sports, Sports for All, and Sports as an Industry. The policy mentions goals, strategies, responsibilities, and roles of all institutions involved in sport. b) *One Student One Sport* (2011), targeting adolescents and school children. It is mandatory for students to participate in at least one sport systematically planned and organised at school. Policy goals include, for example: sports culture development; self-esteem building; physical fitness improvement; fostering racial unity; and providing balance between physical fitness and academics. - PA programmes/initiatives by the Ministry of health: *10,000 steps a day* (2009), *Want to be Healthy* (2013), and *Young Doctors* club (issued in 2006 in collaboration with the Ministry of Education).
Lachat et al., 2013 [140]	- The Malaysia Ministry of Health—National Coordinating Committee on Food and Nutrition issued the *National plan of action for nutrition of Malaysia (2006–2015).* - National policy includes the following targets and actions for PA promotion: increase the ratio of persons engaged in minimum 30 minutes of PA per day, three times a week (in relation to the First Malaysian Food Consumption Survey); and promote physical fitness activities at the worksites for the whole population.
Aman, 2005 [66]	- *National Sports Council of Malaysia Act* (1971) had a goal to develop sport for the nation building purposes. The Government used a sport policy and sport funding to promote nationhood objectives, mainly the pursuit of harmonious multiculturalism. - The central administrative body for the recreation and sport issues is the Ministry of Youth and Sport. Sport is considered to be just a sub-sector of youth policies, and leisure receives a secondary or tertiary focus by official administrative bodies. Some of the strategies of the Ministry to increase the proportion of people participating in healthy and active lifestyle are *Sport for All* and *Active Malaysia*. - Initiatives, policies, or programmes related to leisure and sport include the following: *The National Sport Policy*, *The National Youth Policy*, and *National Fitness and Recreation Council* (issued by the Ministry of Youth and Sport); *National Park Act 1980* (issued by the Ministry of Science, Technology and Environment); *National Forestry Policy 1978* (issued by the Ministry of Forestry); *Town and Country Planning Act 1976*, *Development Plan Rules 1984* (issued by the Ministry of Housing and Local Government); and *Malaysia School Sports Council* (issued by the Ministry of Education). - PE is mandatory in primary and secondary schools. - Malaysian leisure policies are generally not research-based. - Approach to sports policy is top-down and the government has a big, direct influence on recreation and sports organisations.
Maldives	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.

Malta	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *A Strategy for the prevention of non-communicable diseases in Malta.*
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Dare to be active! Physical activity guide for youth,* issued in 2010. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people. - The document includes recommendations on SB for children/young people.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The document *Re-Shaping sport – towards personal development, health and success 2007–2010*, issued in 2007 by the Ministry of Education, Youth and Employment, mentioned that PA levels should be increased and that children should engage in at least one hour of PA daily.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *A strategy for the prevention of non-communicable diseases in Malta* (2010); *Together for a sustainable future. Chapter 9. Investing in our children's education* (2009); *Reshaping sports – towards personal development, health and success. A medium-term strategic plan for enhancing sports culture in Malta 2007–2010* (2007); *Draft National Environment and Health Action Plan 2006 – 2010* (2006); and *Sports Act Chapter 455* (2003). - Since 2003, there has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the Health Promotion and Disease Prevention Directorate. The participating stakeholders are: government departments on education, health, youth, sport; local government; academia; and Malta Olympic Committee and Education.
World Health Organization, 2007 [227]	- The Malta Environment and Planning Authority, the Malta Transport Authority, and the Ministry of Health are represented within a transport and environmental committee. The committee has been established for promotion of safer transport, including active transport, such as cycling and walking to school.
Marshall Islands	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Mauritius	
Lachat et al., 2013 [140]	- The Ministry of Health & Quality of Life—Nutrition Unit issued the *National plan of action for nutrition 2009–2010*. - National policy includes the following targets and actions for PA promotion: stressing out in the dietary guidelines the maintenance of healthy weight by undertaking sufficient PA; cooperation of ministries of health and finance; and focus on the promotion of PA in elderly population. - The policy included detailed actions and an implementation plan for stakeholders. - The policy contained strategies for PA promotion that targeted educational institutions.
Mexico	
Galaviz et al., 2016 [106]	- The assigned grade for the indicator *Government strategies* from *RC on PA for Children and Youth* is C. - New *National Strategy to Prevent Obesity and Diabetes* replaced the *National Food Health Strategy.* - Under the *National Program for Physical Culture and Sports* two programmes were introduced: *Muevete en 30* (the promotion of PA in adults and children) and *Ponte al 100* (an assessment of children's functional capacity). - The budget for PA promotion was $180 million in 2013 and $202 million Mexican pesos in 2014. - Government initiatives related to active transportation included, for example: Sunday open streets for pedestrians and bicyclists; bicycle sharing programmes; public bicycle parking; pedestrisation of streets. - Even though PA policy has been introduced in Mexico, a "leadership from the public health sector is lacking".
Pérez-Escamilla, 2016 [167]	- Interdisciplinary and intersectoral committee of eleven experts and eleven external advisors developed the *Mexican Dietary and Physical Activity Guidelines.* One of the recommendations relates to PA and mentions that in addition to routine daily activities

	it is necessary to engage in PA every day for 30 minutes or more (e.g. fast paced walking, playing, or dancing).
Pratt et al., 2016 [171]	- In Mexico, a policy drives PA research and not the other way around.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Ponte al 100: Checate, midete, muevete; Estrategia Nacional para la Prevencion y Control del Sobrepeso la Obeisidad y la Diabetes.*
Méndez, 2015 [153] (in Spanish language)	- *General Law on Physical Culture and Sports* (2014) and *National Programme of Physical Culture and Sport* (2014) are the key documents for PA promotion. - There is a lack of genuine implementation of PA public policy, but some separate actions are in place that contribute to the education and public health. - Three key issues that could lead to the failure of PA promotion policy are: generality (a policy includes general objectives but lacks methods of evaluation and specific operative projects); institutional vision; and difficulty in defining proper distribution of responsibilities on different government levels. - The public policy for PA promotion lacks concrete tasks to reduce people's sedentary lifestyles through the development of specific programmes for different target groups and strategies for rebuilding public spaces for sport practice.
Rodriguez Martinez et al., 2014 [183] [182]	- The assigned grade for the indicator *Government* from *RC on PA for Children and Youth* is "6" (C). - Most of the PA policies were intersectoral and mostly created by the Ministry of Public Education and the Ministry of Health and their cooperation with the private sector. - The *National Food Health Strategy* (2010) mentions specific strategies for PA promotion within schools.
Pilar Rodriguez et al., 2012 [170]	- The assigned grade for the indicator *Policy and programs* from *RC on PA for Children and Youth* is "7" (good), (B-). - The main purpose of the *General Law on Physical Culture and Sports* and its Regulations (2003) are: the establishment of coordination between municipal and federal state governments and creation of agreements for inclusion of private and social sectors in matters related to sports and physical culture. - National Physical Culture and Sports Commission is a leading body for sports at the national level that drafted *National Plan for Physical Culture and Sports* (2008). - Programmes by the Ministry of Health that promote PA are *Five Steps for Your Health* and *The National Healthy Food Agreement: Strategy against Overweight and Obesity* (2010).
Micronesia, Fed. Sts.	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Moldova	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National health policy: 2007 – 2021.*
Lachat et al., 2013 [140]	- The document entitled *National health policy: 2007–2021* is available. - National policy includes the following targets and actions for PA promotion: expand special grounds for PA and urban public green space, for the whole population; enable wide communication at the population level for PA promotion; including sedentary population and elderly; enable revival of regular short brakes at workplace and in schools; and encourage PA through school curricula and school support. - The policy mentioned the need for urban planning and sports infrastructure and mentioned specific strategies to address sedentary lifestyles.
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2007 [227]	- A plan to strengthen PA is in preparation and there is political will to increase the amount allocated resources in the budget for the sports facilities exist.
Monaco	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
Mongolia	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).

Chimeddamba et al., 2015 [92]	- *The National Strategy on Healthy Diet and Physical Activity 2010–2021* was issued in 2009 by the Government of Mongolia. It aims to reduce mortality and morbidity caused by NCDs by creating supportive environments for PA at community, individual, national, and organisational levels. - When the Mongolian NCD prevention policy was weighted against objectives of the *WHO 2008–2013 Action Plan for the Global Strategy for the Prevention and Control of NCDs* authors of the paper found gaps and negligence regarding the PA guidelines and PA promotion. - Strengthening and reinforcing the existing national PA policies and action plans with additional strategies is recommended.
Lachat et al., 2013 [140]	- In 2007, the Ministry of Health issued the *National programme on prevention and control of noncommunicable diseases*. - The national policy included the following targets and actions for PA promotion: create market incentives and tax measures to support PA promotion; enhance quality and accessibility of facilities and areas related to sport and improve their safety lighting; promote PA at the population level; develop and implement distance and informal learning training programme about PA; provide advice for the promotion of active movement and physical culture; design population specific standards and PA guidelines; and introduce elementary PA knowledge into secondary schools' curricula. - The policy mentioned the need for urban planning and sports infrastructure, and contained strategies for PA promotion that targeted educational institutions. - The policy included detailed actions and an implementation plan for stakeholders.
Montenegro	
Lachat et al., 2013 [140]	- In 2009, the Montenegro Ministry of Health issued the *Action plan for nutrition and food safety for Montenegro 2010–2014*. - National policy includes the following targets and actions for PA promotion: create awareness in media; help local government in building safe paths for pedestrians and bicycle riders and designing models for PA facilities; local governments should enable conditions for the development of PA facilities (such as playgrounds, swimming pools, cycling and walking roads, parks) and infrastructure; develop PA programmes for universities, schools, and kindergartens; organise educational programmes in schools about the significance of PA; and develop conditions to support walking and cycling in traffic.
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
Morocco	
World Health Organization, 2014 [232]	- There is a policy for healthy lifestyles promotion (details not specified). - Legislation that mentions the requirements for the PE curriculum across different school grades was identified. - Besides the general population, the population groups that are covered in national policy documents are: children and young people; older adults; workforce/employees; women; the clinical population with chronic diseases; sedentary/the most inactive; low socioeconomic groups; and families. - Settings covered by national policy documents are: primary schools; high schools; colleges/universities; primary health care; clinical health care; workplace; sport and leisure; transport; environment; and urban design/planning.
Lachat et al., 2013 [140]	- In 2013, the Ministry of Health, United Nations Children's Fund issued *La strategie de la nutrition 2011–2019*. - National policy includes the following targets and actions for PA promotion: by 2019, 80% of children and 70% of the general population should become active; and advocate for the environment and public space suitable for PA. - The policy contained strategies for PA promotion that targeted educational institutions.
Mozambique	
Prista et al., 2016 [173]	- The assigned grade for the indicator *Government* from *RC on PA for Children and Youth* is F. - Policies for PA and sport promotion exist, but they are not implemented or put into action. - There is no plan or strategy for PA and sport promotion in children. - There is a lack of data from authorities related to PA promotion.

Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Prista et al., 2014 [174]	- The assigned grade for the indicator *Policy* from *RC on PA for Children and Youth* is C. - There are several government regulations and laws on the promotion of participation in sport and for PA promotion, but they refer less to PA in general than to formal sport. - Three main policy documents for PA promotion in adolescents and children are: *Strategic Plan for Education from 2012 to 2016*; the *General Regulation for Physical Activity and Sports*; and *Decree Law for Scholar Sports Regulation*. - Policies did not create the necessary conditions for proper PA promotion, but they have established an official stand that recognises the importance of PA in youth development and public health in general.
Myanmar	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Nepal	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Netherlands	
Coenen et al., 2017 [38]	- *Physical Activity Guidelines* (Ministry of Health, Welfare and Sport, 2014) do not include recommendations on SB.
Burghard et al., 2016 [87] [88]	- The indicator *Government Initiatives* from *RC on PA for Children and Youth* did not receive a grade, it was marked as incomplete, because of unclear benchmark/criteria. - The Ministry of Health, Welfare, and Sports published the *National nota health policy. Health near by* (2011). The Ministry has been providing the resources to stimulate activities such as: exercise close to home; customised and reliable information; and accessible opportunities. The budget for this policy declined over time; it was €64 million, €59 million, €53 million, and €48 million in 2011, 2012, 2013, and 2014, respectively. - There is no national norm related to SB. - Three key policy vision points by the Government are: the Government will help people to protect their health with laws, regulations and a surveillance system; sport and health care should be easily accessible and close to home for everyone; and the Government would not like to dictate people's lifestyle choice, as it is a person's own decision to engage in certain activities or not.
Hämäläinen et al., 2016 [115]	- Relevant HEPA national policy documents include: *Health close People 2012–16*, *Sports & Physical Activity in the Neighbourhood 2012–16*; and national/local - *Youth on healthy weight 2010–15*. - HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; contacts between public sector officers responsible for HEPA between levels; established systems of policymaking; steering committees; private sector involvement in policymaking; and formal consultation on HEPA policy for stakeholders. - There are no: field visits to make a policy; public hearings for citizens; national/regional/local politically elected councils; intersectoral committees or working groups for HEPA; scientific advisory groups/institutes/individuals; and administrative working groups including only public sector officers.
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *The power of sport,* issued in 2005. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people. - The document does not include recommendations on SB.
Stuji & Stokvis, 2015 [200]	- Involvement in sport by the Government intensified by the end of 1960s. In 1969, a *Discussion document concerning sport policy* was issued by the Minister of Culture, Recreation, and Social Work and stated that sufficient amount of PA is important for

	good physical health, which was the first-time health was linked with sport in a policy document in the Netherlands. - In 1983, *Memo accents sport policy 1984 and further* was issued by the Ministry of Welfare, Public Health, and Culture. It contained more precise information on the relationship between sport and certain aspects of health. It also noted that only competitive and elite sports were considered as sport, whilst this concept is now much broader and also includes recreation. - In 2001, the document *Sport, exercise and health,* issued by the same Ministry, for the first time included scientific references to support stated objectives.
Bull et al., 2014 [85] [83] [84]	- The Ministry of Health, Welfare, and Sport is the responsible body for PA. - Key documents related to PA include: *Excellence at Every Level* (2009); *The power of Sport* (2008); *The Sport, Physical Activity and Education Policy (2008)*; *Being Healthy and Staying Healthy: A Vision of Health and Prevention* (2007); *Together for Sport* (2006); *Opting for a healthy life, Public Health policy in the Netherlands 2007-2010* (2006); *Time for Sport* (2005); and *Dutch Bicycle Master Plan* (1999). - The document *Agenda for a living countryside: multi-year programme for a living countryside 2007-2013* puts a strong emphasis on walking. - PA is not a Government's priority, but there is a significant political commitment to PA promotion.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The policy document *Time for sport: exercise, participate, perform* was issued in 2005. It was complemented (but not replaced) by the new policy document *The power of sport*, issued in 2008. Both documents were issued by the Ministry of Health. In this study, the two policy documents were referred to as a single strategy. - The strategy includes the following quantifiable targets: by 2012, at least 70% of adults should engage in the recommended amount of exercise; and, by 2012, there should be less than 5% of inactive people. - The strategy also mentioned the following vulnerable groups with low PA levels: chronically ill people and people with disabilities; elderly; residents of deprived areas; and immigrants. It is also stated that sport and PA are especially important for their social integration and health.
Kalman & Hamrik, 2013 [128] (in Czech language)	- In a policy document (name not specified) related to PA the following target groups are specifically addressed: chronically ill people; people with disabilities; elderly; youth; and people with professional difficulties.
Ceccarelli et al., 2011 [90]	- The quantifiable targets mentioned in the analysed policy document (details not specified) are: by 2010, at least 65% of adults should meet the exercise standards, compared to 60% in 2004; the number of young people (12-17 y.o.) meeting the exercise standards should increase to 40% compared to 35% in 2004; and 90% of young people should have the opportunity to participate in sport after school or in school, five times a week. - The stakeholders related to PA and sport mentioned in the policy document are: sports goods manufacturers; media; and advertising and recreation businesses.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Memorandum on obesity – out of balance: the burden of obesity* (2010); *National Action Plan for Sport and Exercise* (2006); *Sport action plan against obesity* (2005); *Time for sport: exercise, participate, Perform* (2005); *Covenant on overweight and obesity, a balance between eating and physical activity* (2005); *National Plan of Action for Children 2004*, *Living longer in good health, also a question of a healthy lifestyle* (2004); and *Towards an active policy* (2003). - Since 2003, there has been a coordinating mechanism in the area of PA promotion and the leading institution has been the National Institute for Sports and Physical Activity. The participating stakeholders are: government departments on sport, food, research, education, transport and labour; communities; and academia.
Daugbjerg et al., 2009 [11]	- The policy document *Time For Sport—Exercise, Participate, Perform* (2005) contains quantifiable PA goals and a budget for policy implementation. It does not contain a requirement/intention for evaluation. From the three components mentioned, the document *National Plan of Action for Children* (2004) contains only a requirement/intention for evaluation. - The document *Living longer in good health—also a question of a healthy lifestyle* (2004) has the time frame from 2004 until 2007 and it contains budget and a requirement/intention for evaluation, but it does not contain quantifiable PA goals.

	- The document *Toward an 'active' policy* (2003) does not contain either of the three components.
Branca et al., 2007 [80]	- The document *Living longer in good health: also a question of healthy lifestyle. Netherlands Health-Care Prevention Policy* (2004) stated that in 2004 the aim was to spend €45 billion on health care, including €625 million for health protection and promotion. It was issued by the Ministry of Health, Welfare and Sport.
World Health Organization, 2007 [227]	- Policy documents related to PA are: *Sport action plan against obesity* (2005), *Towards an active policy* (2003) and *Time for sport* (2005). - *Time for sport* pays special attention to HEPA. The main target for the year 2010 is to increase the percentage of population engaged in PA at least 30 minutes/day or the number of people in the population who play sports at least three times a week, by 5%.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- The following documents related to PA promotion were identified: *What sport sets in motion. Contours and priorities of central government policy on sport* (1996); *Sport and Sports Policy in the Netherlands* (1997); *Opportunities for Top-Class Sport. The Government's Policy on Top-Class Sport* (1999); *Sport for All incentive in the Netherlands* (2000); and *Towards an 'active' policy* (2003). All the documents were issued by the Ministry of Health, Welfare and Sport. The focus of the last document was placed on the relationship between exercise, sport, and health. Some of the quantifiable targets are: increase the prevalence of PA to 45% in 2005 and to 50% in 2010 (compared to 40% in 1998); and decrease the prevalence of physical inactivity to 10% in 2005 and to 8% in 2010 (compared to 12% in 1998).
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There is a national policy for the promotion of PA entitled *Netherlands on the Move* that aims at the following target groups: children; elderly; working population; and chronically ill people. The policy is endorsed and financed by the Government.
New Caledonia	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
New Zealand	
Coenen et al., 2017 [38]	- Measures to reduce occupational SB included in the *Guidelines for using computers - Preventing and managing discomfort, pain and injury*, issued by the New Zealand Government in 2010, specify how often and for how long brakes should be taken in different working contexts.
Maddison et al., 2016 [149] Maddison et al., 2015 [148]	- The assigned grade for the indicator *Government Initiatives* from *RC on PA for Children and Youth* is B-. - The PA guidelines for children and youth state that children and youth (5 to 18 y.o.) should accumulate 60 minutes or more of MVPA per day and recommend to spend less than two hours daily in front of the computer, television, and gaming consoles. - There is no national-level framework for PA promotion. - There are no clear strategies for evaluation. - The *Childhood Obesity Plan*, published by the Government in 2015, is focused on PA, environment, and nutrition. - Some examples of actions and initiatives include: *Guidelines for Sustainable Physical Activity in School Communities*; *Good Practice Principles for the Provision of Sport and Recreation for Young People*; *ActiveSmart*; *BikeWise*; and *Sport in Education*.
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Maddison et al., 2014 [147]	- The indicator *Government Initiatives* from *RC on PA for Children and Youth* did not receive grade. It was marked as incomplete. - The following sector-based and government-led strategies, policies, and funding programmes were identified: sport and recreation (e.g. *Kiwisport Partnership Fund*, *ActivePost*); transport (e.g. model communities and *BikeWise*); education (e.g. *Health and PE curriculum*, *Kiwisport school funding*, *Sport in Education*); and injury prevention and health (e.g. *Physical Activity Guidelines*, *Health Promoting Schools*).
Brown et al., 2011 [43]	- National documents related to PA are: *Health of Older People Strategy* (Ministry of Health, 2002); Physical Activity (Ministry of Sport Fitness and Leisure, 1999); and *New Zealand Physical Activity Guidelines* (Hillary Commission 2001). The guidelines were based on the *Surgeon General's Report* (USA, 1996).
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity are general

	and not quantifiable and measurable. - The analysed policy document (details not specified) explicitly refers to the international assessment of the obesity problem or to the *WHO Global Strategy on Diet, PA and Health.*
Gillon, 2010 [107]	- Sport and Recreation New Zealand (SPARC) is a government organisation responsible for the promotion and monitoring of PA. - SPARC issued a *Strategic Plan 2009-2015* and listed government priorities related to recreation and sport, including: improvement of resources for high performance sport; enhancing school-based initiatives; strengthening of grassroots sports delivery; and improving accessibility of opportunities related to physical recreation. - *Sport and Recreation Act 2002* balances between the importance of PA and sport and emphasises the importance of participation of all people in sport and recreation to achieve wellbeing and health. It mentions the following specific target groups and their inclusion and active participation in recreation: Maori; women; Pacific peoples; people with disabilities; and elderly.
Piggin, 2008 [168]	- The report *Getting set for an active nation* (informally called *Graham Report*) by the Ministerial Taskforce made a number of recommendations for the national recreation and sport policy such as: increasing the school day for 30 min per day for an obligatory PE session (for 5-12 y.o. children); replacing the Hillary Commission for Sport, Fitness and Leisure with a new organisation; and better rationalisation of elite sport. - In 2002, Hillary Commission was replaced by Sport and Recreation New Zealand (SPARC). - Throughout time, SPARC was perceived as, for example: an “omnipotent state monolith”; an organisation of individuals that are doing their best to encourage people to engage in PA; and an arrogant organisation that aimed at reinforcing masculine historical understanding of sport.
Aman, 2005 [66]	- *The Physical Welfare and Recreation Act* (1937) was the first leisure-related legislation. It aimed to: raise the standard of fitness and health; encourage active participation in recreation activities; enhance formation of youth clubs; and provide training to leaders of various organisations. - *The Recreation and Sport Act* 1973 had a much wider goal than just sport promotion. It aimed to improve mental and physical health of the population. - *Recreation and Sport Act* 1987 mentioned disestablishment of the Ministry and Council for Recreation and Sport. The Council was replaced by the Hillary Commission for Recreation and Sport (“quasi-autonomous non-government organisation”). The establishment of the Comission was the way towards “depoilitisation” of recreation and sport. - *The Sport, Fitness and Leisure Amendment Act* 1992 was mainly focused on achieving exercise and fitness through involvement in sport. - New Zealand has no comprehensive, formal leisure policy.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- National Physical Activity Taskforce was established in 1998, with a goal to address the problem of physical inactivity. - The document *Getting set - For an Active Nation* was issued in 2001. It provided a 25-year vision for increasing PA levels. In the same year the *Guidelines for Promoting Physical Activity (movement = health!)* were issued by the Hillary Commission. - In 2003, SPARC produced a document *Towards an Active New Zealand – Developing a National Policy Framework for Physical Activity and Sport*, stating that effective strategies have to be provided for the: whānau; people with disabilities; Pacific people; hapu; women; iwi; and older adults. SPARC’s policies and programmes were funded by the New Zealand Lottery Grants and the Government. The financial support varied from $50 million (in 2002/03) to $70 million (by 2005/06).
Nicaragua	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Niger	
Lachat et al., 2013 [140]	- The document *Politique nationale en matiere d’alimentation et de nutrition* was issued in 2006. - The national policy target/action for PA promotion is to promote a healthy lifestyle in communities and families to enable relaxation and sport to become widespread within the local surroundings.

Nigeria	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Adeniyi et al., 2016 [59]	- The assigned grade for the indicator *Government, Nongovernmental Organizations, and Private Sector (Strategies and Investments)/Policy* from *RC on PA for Children and Youth* is B. - There are school policies for teaching health and PE. They contain a provision that mentions suitable environment for youth and children to participate in sport activities. - In 2004, the Federal Ministry of Education issued a *National Policy on Education.* The document includes policy on PE and PA.
Akinoroye et al., 2014 [61]	- The indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete. - Government policy on sports exists, but there is no further information on implementation and investments related to the policy. According to the policy, the Schools Sports Federation and the Nigeria Academicals Sports Committee were legally obliged to cooperate with the local and state governments in sports promotion in schools. However, no evidence is available related to the effectiveness of this policy or regarding any other policy objectives.
Northern Ireland	
Coenen et al., 2017 [38]	- In the publication *Start active, stay active - A report on physical activity for health from the four home countries' chief medical officers*, issued by the Government's Department of Health in 2011, it is stated that "all adults should minimise the amount of time spent being sedentary (sitting) for extended periods".
Harrington et al., 2016 [120] [121]	- The indicator *Government* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete. - The reasons for not assigning a grade are the gaps in national level surveillance of PA in children and uncertainty whether investments in this area exist or not. - The following documents that include targets for children's PA were identified: *A Fitter Future for All Obesity Action Plan 2012-2022* and *Sport Matters: the Northern Ireland Strategy for Sport & Physical Recreation 2009 – 2019*. - Minimisation of the time spent in SB has been recommended within the guidelines *Start Active, Stay Active: A Report on Physical Activity for Health from the Four Home Countries* issued by the United Kingdom Chief Medical Officers. - The following documents related to active travel were identified: *An Action Plan for Active Travel in Northern Ireland 2012 – 2015* and the *Northern Ireland Changing Gear – A Bicycle Strategy for Northern Ireland 2015.*
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the documents entitled *Obesity Framework for Northern Ireland 2012-2020, Sport Matters* and *The Northern Ireland Strategy for Development of Sport and Physical recreation 2009-2019.*
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical Activity, Health Improvement and Protection. Start Active. Stay Active: A report on physical activity from the four home countries',* issued in 2011. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations for children/young people and adults are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults and recommendations on SB for children/young people, adults, and older adults.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following documents related to sport promotion were issued in 2009: *Sport matters: a culture of lifelong enjoyment and success in sport 2009–2019,* and the action plan *Sport Northern Ireland, Corporate plan 2008–2011.* In this study, the two policy documents were referred to as a single strategy - The strategy mentions PA-related aims such as: ensure that 90% of the population has access to sport facilities by 2019 (within twenty minutes travel time); and increase participation of adults in recreation and sport by at least 3% compared to the 2011 baseline.
Harrington et al., 2014 [118] [119]	- the indicator *Government* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete, because national PA plan and health surveillance system were lacking.

Pate et al., 2011 [37]	- Policy related to PE in schools states that: children should engage in at least two hours of PE a week; PE should be taught by highly qualified and certified teachers; and PE curriculum should be included in the school review process. - PA policy within the area related to community environmental support states that: access to public sports facilities and venues should be free or offered at discounted prices for students; parks, playgrounds, and open spaces that are interesting and challenging for youth and children should be created; community organisations and local authorities should be support, funded, and encouraged to develop PA promotion programmes for families to help them become active and use the existing infrastructure; and cooperation between colleges, youth clubs, and schools with community groups, local authorities, and health professionals should be encouraged to design programmes to increase involvement in PA. - PA policy in the area related to school environmental support states that: access to a broad range of activities such as dance, sports, active travel, play, exercise and being active in daily tasks should be provided around and in school; schools should be encouraged to conduct fitness tests of their students annually and store the collected data; parks around schools and school playgrounds should be designed and renovated to inspire sport, movement, play, and outdoor education; awards should be given to schools for promoting holistic health in the school settings, including the promotion of PA in students, parents, and staff. - PA policy within area related to active transport/urban design states that: schools and education boards should collaborate with Department of the Environment to provide safe routes to schools; designated car drop off zones half kilometre from schools should be established and walking from the zones to school should be organised and supported. - The data were extracted from the following documents: *Physical Activity: An Investment in Public Health* and *The Northern Ireland Physical Activity Strategy Action Plan 1998–2002.*, issued in 1997 by the Health Promotion Agency for Northern Ireland.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Walking Northern Ireland, an Action Plan* (2003); *Northern Ireland's road safety strategy 2002–2012* (2002); *Northern Ireland Cycling Strategy* (2000); and *The Northern Ireland Physical Activity Strategy Action Plan 1998–2002* (1998).
Bornstein et al., 2009 [79]	- In the document *Physical Activity: An Investment in Public Health: The Northern Ireland Physical Activity Strategy Action Plan 1998-2002 s*ome of the targeted population groups are: people older than 50; young mothers and young people in general; unemployed; and young people of school age (with female teenagers as a special subgroup). - The document provides a detailed accountability chart for all bodies that participate in carrying out the objectives of the action plan. Some of the mentioned goals to be achieved by 2002 were to: reduce the number of people (older than 16) who are classified as sedentary from 20% to 15%; and increase the number of people who achieve recommended PA levels from 30% to 35% among men and from 20% to 25% among women.
Musingarimi, 2009 [158] Musingarimi, 2008 [157]	- The document *The Northern Ireland Physical Activity Strategy Action Plan 1998-2002* provides a framework for policy development and implementation of PA programmes. - The document *Fit Futures: Focus on Food, Activity and Young people* aims to tackle obesity and overweight in children and youth by identifying opportunities that support active living and healthy eating.
Northern Mariana Islands	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Norway	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *The Action Plan on Physical Activity 2005-2009. Working Together for Physical Activity. 8-2-0005* is available.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical activity. In: Nordic Nutrition Recommendations 2004 Integrating nutrition and physical activity,* issued in 2004 by the Nordic Council of Ministers. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for

	children/young people. - The document does not include recommendations on SB.
Bull et al., 2014 [85] [83] [84]	- The following documents related to PA promotion were identified: *Outdoor Recreation Act*, *The Planning and Building Act* (2009); *White Paper No.39 Outdoor recreation (Friluftsliv) - A way to better the quality of life* (2001); *Government's Environmental Policy and the State of the Environment in Norway* (2005); *White Paper No. 14 to the Storting (1999) Sport in a State of Change - About the State's relationship to sport and physical.* - *The Action Plan on Physical Activity 2005-2009* is a product of the intersectoral work of eight ministries. It contains 108 measures for increasing PA and was evaluated. - The environment sector is mentioned as a key area for PA promotion.
Kalman & Hamrik, 2013 [128] (in Czech language)	- In the policy document (details not specified) related to PA it is mentioned that the "recipe" for a healthy Norway is in emphasising the importance of PA, health, and well-being for the whole population.
Brown et al., 2011 [43]	- The national document the *Action plan on physical activity 2005–2009 – Working together for physical activity* was issued in 2005 by the Norwegian Government.
Ceccarelli et al., 2011 [90]	- *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. - The document includes a thorough analysis of PA and eating habits of the population.
Pate et al., 2011 [37]	- PA policy measures were found in the following areas: a) PE in school (e.g. requirement of at least two hours of weekly PE for all children that should be taught by highly qualified and certified teachers; b) health education (e.g. enable training for healthcare professionals in schools in motivational interviewing techniques related to PA, establishment of cooperation with universities to provide teacher education classes for inclusion of the *PA and Health* topic into the curriculum); c) community environmental support (e.g. support, fund, and encourage community organisations and local authorities to develop PA promotion programmes for families to get them active and use the existing infrastructure); d) school environmental support (e.g. provide access to a broad range of activities such as dance, sports, active travel, play, exercise, and being active in daily tasks around and in schools); e) active transport/urban design (e.g. a car drop off zones half kilometre from schools and support it by organised walking to school from the zone); and f) mass media/advertising campaigns (e.g. support a comprehensive, community wide PA campaign that provides opportunities and education to children and families in schools, communities and neighbourhoods). - The data were extracted from the *Action Plan on Physical Activity 2005-2010*, issued in 2005 by the Ministry of Health and Care Services.
Skille & Sobakken, 2011 [195]	- In 1946, the Department of Sport Policy was established. Its work had been guided by the "Sport for All" vision which was a part of a greater idea to (re)build the welfare state. In contemporary Norway, this institution, along with the Norwegian Olympic and Paralympic Committees and the Confederation of Sport (NOC), is in charge for achieving the overall "Sport for All*"* vision. The Government has the responsibility to accomplish this goal, which can be achieved by sharing the work between voluntary and public institutions. - All white papers related to sport in 1970s and 1980s were a part of White Papers on culture because sport is defined as culture, because of its associated intrinsic values, such as mastery, achievement, and joy. The White Papers published from 1990s (St. meld. no. 41, 1991–1992 and St. meld. no. 14, 1999–2000) were exclusively on sport. - The White Paper *Prescription for a healthier Norway* (Government, 2002–2003), states that the goal of health policy is to "treat less and prevent more". It mentioned PA as one of five key concepts. - Documents published by NOC contain "lofty formulations". Measurable and quantifiable goals are only related to elite sport (*Idrettspolitisk dokument 2003–2007*, *Idrettspolitisk dokument 2007–2011*).
World Health Organization, 2010 [230]	- The National Board of Nutrition and Physical Activity was established in 1999 when national policy started to focus on PA. In 2002, the Board split into a board for PA and a board for nutrition. - In 2003, the Ministry of Health published the *Prescription for a healthier Norway* (a white paper). The document mentioned PA as one of the five most significant public

	health areas for the next ten years. - In 2003, the Ministry of Education published *Culture for learning* a white paper that showed a focus on PA among education authorities.
Bornstein et al., 2009 [79]	- In the *Action Plan on Physical Activity 2005-2009: Working Together for Physical Activity,* the timeline for achieving goals was not identified. Key aims of the plan are to increase the proportion of youth and children who engage in PA for at least 60 minutes per day and the proportion of elderly and adults who are moderately active for at least 30 minutes per day.
Daugbjerg et al., 2009 [11]	- The policy documents *National Report on Youth Policy in Norway* (2004), *The Government's Environmental Policy and the State of the Environment in Norway* (published in 2005, time frame until 2007), and *Prescriptions for a Healthier Norway. A broad policy for public health—short version* (published in 2003, ten-year time frame) do not contain quantifiable PA goals, budget for policy and a requirement/intention for evaluation. From the three components, the document *Working together for physical activity. The Action Plan on Physical Activity 2005-2009* (2005) contains only a requirement/intention for evaluation.
Bergsgard et al., 2007 [76]	- "Sport for All" has been continuously recognised in Government's policy documents as the key objective of the sport policy and responsibility for its development is at the national level. The Government supports "Sport for All" by providing support for facilities and activity programmes. In the past 10-15 years, sport has received increasing financial support, almost completely from the lottery. The Ministry for Culture and Church Affairs is responsible for all national sport policies, concerning both elite and mass sport.
Branca et al., 2007 [80]	- *Working together for physical activity. The Action Plan on Physical Activity 2005–2009* (2006) proposed to include a provision in the legislation *Working Environment Act* that obliges employers to consider PA as part of company's support of safe and healthy work environments.
World Health Organization, 2007 [227]	- In 2005, the Parliament adopted the *Action plan for physical activity 2005–2009*, which is the result of a joint effort of 8 ministries. It comprises of 108 measures across different areas such as schools, workplaces, leisure activities, kindergartens, urban planning, and transport. - A communication strategy for 2005–2009 was created to increase the knowledge about health and PA and to motivate people to adopt active lifestyles.
Oman	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Oman National Policy for the Prevention and Control of NCDs 2015-2025.*
Al-Bahlani & Marby, 2014 [62]	- The Ministry of Manpower issued a regulation *Occupation Safety and Health Organisational Regulation in the Institutions Subject to the Labour law* (2008) for promoting PA at the workplace. - The *Sports Strategy* issued by the Ministry of Sports Affairs for promoting sports - A policy for PE curriculum was issued by the Ministry of Education (details are not specified). - Two documents that include PA recommendations were issued by the Ministry of Health (one document is entitled *Omani Guide to Healthy Eating*, whilst the name of the second document is not specified).
World Health Organization, 2014 [232]	- There is a national strategy or policy addressing PA and diet/nutrition (details not specified). - It has been reported that national PA recommendations have been developed. - The National Olympic Committee, under the supervision of the Ministry of Sports, is providing leadership in PA promotion. - Besides the general population, the population groups that are covered in national policy documents are: children and young people; workforce/employees; the clinical population with chronic diseases; and sedentary/the most inactive people. - The settings covered by national policy documents are: primary schools; high schools; primary health care; workplace; sport and leisure; transport; environment; and urban design/planning.
Pakistan	
Nishtar et al., 2006 [160]	- The *National Action Plan on NCD Prevention, Control, and Health Promotion* was released in May 2004. It was developed through joint efforts of the Ministry of Health, an NGO focused on prevention of chronic diseases *Heartfile* (an Islamabad, Pakistan-based non-profit organisation), and the WHO. They also jointly funded the first implementation phase of the Plan (May 2004

	– July 2006). This phase had many action items and three priority areas related to the research, institutional mechanisms, and policies and legislation. One of the action items under *policies and legislation* area was the development of PA policy.
Palau	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Papua New Guinea	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Paraguay	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Peru	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Philippines	
Lachat et al., 2013 [140]	- In 2011, the Philippines Department of Health issued the *National policy on strengthening the prevention and control of chronic lifestyle related non communicable diseases*. - National policy includes the following targets and actions for PA promotion: regulate built environment for PA promotion; implement and develop health promotion activities for PA; reduce the prevalence of "high physical inactivity" in adults from 60.5% to 50.8%. - The policy mentioned specific strategies to address sedentary lifestyles.
Poland	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National Health Programme 2007 – 2015.*
Zembura et al., 2016 [225]	- The assigned grade for the indicator *Government—Strategies, Policies, Investments* from *RC on PA for Children and Youth* is C. - The Government showed increased commitment and strategic interest for PA promotion. - The Ministry of Sport and Tourism has undertaken four national interventions related to PA under the *Sport of All Children Programme*, but their reach was considered relatively low as they included only 6-8% of children and youth. - Existing programmes are regularly evaluated and recognised by the local community and authorities.
Kahlmeier et al., 2015 [127]	- National PA recommendations are currently in the development process (the documents published until summer 2012 were reviewed).
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- In 2007, the policy document related to sport promotion entitled *Strategy of sport development in Poland to 2015* [*Strategia Rozwoju Sportu W Polsce Do Roku 2015*] was published. It has a goal to improve sports infrastructure. It mentions the needs of people with disabilities and the importance of balancing discrepancies in the availability of sports infrastructures between country's regions. It states that all people should have equal access to sport and PA opportunities, including those from the deprived and rural areas.
World Health Organization, 2010 [230]	- The central objective of the *Strategy of sport development until 2015* (Ministry of Sport and Tourism) is achieving "active and fit society". The Strategy aims to be implemented in the following priority areas: 'Sport for All'; improvement in sport achievements; and the development of sports and recreational infrastructure. Some of the key goals are: improvement of physical fitness in children and youth; reduction of the number of obese individuals; reduction of the number of people with a sedentary lifestyle; development of "active ways" for spending free time; and reduction of morbidity among youth. - Physical Culture Development Fund is responsible for funding further development of sports infrastructure.
World Health Organization, 2010 [229]	- The *National programme for the obesity, overweight, and NCD prevention through diet and improved PA 2007−2011 (POL-HEALTH*) was approved by the Minister of Health and developed in 2007 by the National Food and Nutrition Institute. Activities within the programme mainly focus on increasing the awareness about the importance of PA and healthy diet and at providing comprehensive information and education to consumers.

World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National Health Programme 2007–2015*, issued in2007, and *National prevention programme of overweight, obesity and noncommunicable diseases through diet, and physical activity improvement 2007–2016*, issued in 2006. - There has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the Ministry of Sport and Tourism, the "Sport for All" Department. The participating stakeholders are: government departments on health, sport, and education; NGOs; academia; communities; and research institutes.
World Health Organization, 2007 [227]	- Some of the key objectives of the *National Programme for the Prevention of Overweight, Obesity and NCD through Diet and Improved Physical Activity 2007–2016* are to increase PA and improve nutrition habits in order to reduce the prevalence of obesity and overweight.
Portugal	
Mota et al., 2016 [155]	- The assigned grade for the indicator *Government* from *RC on PA for Children and Youth* is C. - The *National Sports for All Programme* aims at providing strong sport base and better quality of life to all citizens. It highlights the importance of sport for enhancing social cohesion. - Sport policies are integrated in the *Portuguese National Health Plan*, issued by the Ministry of Health, with the time frame until 2010. - The School Sport Council established that organising sport activities is obligatory for all schools.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Health national plan.*
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Bull et al., 2014 [85] [83] [84]	- The Portuguese Sports Institute is the most important institution responsible for sport public policy. - Key legislation including *Law No. 5 / 2007 of January 16 - Law on Physical Activity and Sport established the legal base* and *Law No. 46/86 of 14 October - Law of the Education* states that PE is obligatory for primary and secondary school children. - There are no national PA recommendations.
Rütten et al., 2013 [185]	- Public policies related to LTPA include: *More sports, better quality of life* (2009); *National programme of walking and running* (2009); *National Sports for all Programme - MexaSe* (2005); *National Health Plan 2004-2010*; and *National Programme against obesity* (2004). - Supportive environments for LTPA (indoor/outdoor sport facilities and infrastructure for LTPA) are broadly available. Green space, usable for LTPA, is partially available.
Costa Januario et al., 2012 [94] (in Portuguese language)	- In 2002, the Government's Programme (*Programa do Governo Constitutional*) declared that Portugal was incapable of fulfilling its mission towards sport. Until 2004, no precise goals for the promotion of PA and sport were established by the Government. From 2005, more focused goals were mentioned, for example creating the national "Sport for All" programme by engaging public-private partnerships. Goals from 2005 were reinforced in 2009 and the new programme also focused on more specific targets such as women in sport, elderly, and obligatory PE in schools. - The Government emphasised that participation in sports is the right of every citizen. However, mentioned goals are vague and not precise enough in order to fulfil this right. Besides, no clear idea was identified on how sport should be developed within the framework of local authorities.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity are general and not quantifiable and measurable. Time frame is ten years. - The analysed policy document explicitly refers to the international assessment of the obesity problem or to the *WHO Global Strategy on Diet, PA and Health.*
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *National programme against obesity 2005–2009* (2005); *National Health Plan 2004–2010* (2005); and *National Sports for All Programme Mexa-Se* (2005). - There has been a coordinating mechanism in the area of PA promotion, with the National Institute for Sport as the leading institution. The participating stakeholders are government departments on sport.

Daugbjerg et al., 2009 [11]	- Policy document *National Health Plan 2004-2010 Volume I—Priorities* (2004) contains quantifiable PA goals and a requirement/intention for evaluation, but it does not contain a budget for policy implementation.
Branca et al., 2007 [80]	- *National Programme against Obesity 2005–2009* was published in 2005 by the Ministry of Health.
World Health Organization, 2007 [227]	- The *National programme against obesity* and the *National health plan 2004–2010* both include PA. - The key initiative is *Move it* campaign that aims to promote PA and sport.
Puerto Rico	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Qatar	
Al-Kuwari et al., 2016 [63] [64]	- The assigned grade for the indicator *National Policy*, *Strategy, and Investment* from *RC on PA for Children and Youth* is B. - Health and PA of youth and children are key concerns. - National PA guidelines, issued in 2014, and a national action plan for PA and nutrition have been developed. - There is inadequate data on evaluation and implementation of health and PA policies.
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
World Health Organization, 2014 [232]	- There is a national strategy or policy addressing PA and diet/nutrition (details not specified). - It has been reported that national PA recommendations have been developed. - There is a national coordinating committee for PA. - National policy documents cover: the general population; early years children; children and young people; older adults; workforce/employees; women; people with disabilities; the clinical population with chronic diseases; sedentary/the most inactive people; and families. - The settings covered by national policy documents include: kindergarten; primary schools; high schools; colleges/universities; primary health care; clinical health care; workplace; senior/older adult services; sport and leisure; transport; tourism; environment; and urban design/planning.
Romania	
Hämäläinen et al., 2016 [117]	- The Prime minister and the Ministry of Education and Research are responsible for the document *Movement for health* (2003). It aims to contribute to improving population's health through PE and sport. The document does not include research or other evidence and equality or equity issues. Some of the goals/actions in the document include the following: sport facilities administered by public authorities shall be available for PA recreational purposes at least two hours, three times a week to every citizen; organisation of sports events for the whole population; development of actions and programmes for children and youth. - The Romanian Federation "Sport for All", the Ministry of Health and Family, and the Ministry of Youth and Sport are responsible for the document *Sport for all 3rd Millennium Romania – A Different Lifestyle* (2001). The policy does not mention equality of equity issues. It aims to promote health and "Sport for All", recreation, and education to become a part of people's lifestyles. Some of its subprogrammes include *Old-Sport, Rural Sport, Baby-Sport, Fun-Sport,* and *A chance for everybody.* Some of its goals are to: improve partnerships between economic agents, civil society, and government structures; ensure everyone has free access to PA; and ensure essential conditions like logistics, quality services, management, and human resources for engaging in LTPA in organised settings or independently, in a clean and safe environment. - Besides the general population, some of the target groups mentioned in the documents are: students and teachers; seniors; preschool children; the population in the rural areas; women; and Romanian diaspora.
Hämäläinen et al., 2016 [115]	- HEPA policies cooperation and coordination processes and structures include: government/regional/local committees or working groups with cross-sector representatives; contacts between public sector officers responsible for HEPA between

	levels; scientific advisory groups/institutes/individuals; formal consultation on HEPA policy for stakeholders; and field visits to make a policy. - There are no: national/regional/local politically elected councils; established systems of policymaking; intersectoral committees or working groups for HEPA; steering committees; administrative working groups including only public sector officers; private sector involvement in policymaking; and public hearings for citizens.
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Joint Programming Initiative A Healthy Diet for a Healthy Life.*
Kahlmeier et al., 2015 [127]	- National PA recommendations are reported to exist, but no other details are available.
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Sport Law No. 69/2009 with further amendments and supplements*, issued in 2009, and *Governmental Decision No. 1573/2004 for approval the List of 410 investment objectives of the Programme "Construction of sport facilities"*, issued in 2004. - Since 2005, there has been a coordinating mechanism in the area of PA promotion, and the leading institution has been the National Authority for Youth and Sport. The participating stakeholders are: government departments on youth and sport, research, and education; and the Romanian Olympic and Sports Committee.
Russian Federation	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Modern science-based recommendations to optimise the level of physical activity in the population,* issued in 2011. - Recommendations are provided for adults only. - The PA recommendations are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities and SB.
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2007 [227]	- A PA action plan is under development.
Rwanda	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
San Marino	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
Samoa	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Health sector plan 2008-2018.*
Lachat et al., 2013 [140]	- In 2008, the Ministry of Health issued the *Health sector plan 2008–2018*. - National policy includes the following targets and actions for PA promotion: health promotion programmes should focus on PA as one of four high-risk areas; focus should be placed on women communities, government workers and community groups to support PA and a healthy lifestyle; and PA should be promoted in homes for elderly people.
Saudi Arabia	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *The Health Promotion Programme and healthy lifestyle (2015).*
World Health Organization, 2014 [232]	- There is a national strategy or policy addressing PA and diet/nutrition (details not specified). - There is a policy that mentions the obligatory inclusion of both girls and boys in PE. - International recommendations and guidelines on PA are used instead of national ones. - National policy documents cover: the general population; children and young people; older adults; women; and families. - The settings covered in national policy documents include: primary schools; high

	schools; colleges/universities; primary health care; senior/older adult services; sport and leisure; and environment.
Scotland	
Coenen et al., 2017 [38]	- In the publication *Start active, stay active - A report on physical activity for health from the four home countries' chief medical officers*, issued by the Government's Department of Health in 2011, it is stated that "all adults should minimise the amount of time spent being sedentary (sitting) for extended periods".
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *A More Active Scotland (2014)* is available.
Reilly et al., 2016 [180] [181]	- The assigned grade for the indicator *National Policies, Strategies and Investment* from *RC on PA for Children and Youth* is B. - Scotland's PA policy "has sought to take advantage of the hosting of the 2014 *Commonwealth Games* to provide a population-wide PA 'legacy'". - There is still limited evidence on policy implementation, but the situation is better than in 2013, with "outcome agreements between national and local government in relation to policy". - There are multiple relevant policies for PA promotion, but there is a lack of policies on SB.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical Activity, Health Improvement and Protection. Start Active. Stay Active: A report on physical activity from the four home countries',* issued in 2011. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations for children/young people and adults are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults and recommendations on SB for children/young people, adults, and older adults.
Vallgårda, 2015 [209]	- In 2010, Government published *Preventing overweight and obesity in Scotland. A Route Map Towards Healthy Weight.* In the plan, stronger responsibility is put on the government (to act by changing the environment) than on individuals (to change their behaviours).
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following policies related to HEPA and sport promotion were identified: *Reaching higher – building on the success of sport 21*, issued in 2007 and the action plan *Our plan: corporate plan 2009–2011, Sportscotland*, issued in 2009. In this study, the two policy documents were referred to as a single strategy - The strategy mentions the *Active Schools* programme as a way of reaching "hard-to-reach groups" such as children with disabilities, girls, and inactive children.
Reilly et al., 2014 [179] Reilly et al., 2013 [178]	- The assigned grade for the indicator *National Policies, Strategies and Investment* from *RC on PA for Children and Youth* is B. - There are several limitations mentioned related to this indicator, including: no policies on SB; most policies have not been evaluated; policy implementation may be limited; and there is no policy designed to address rural/urban or socio-economic disparities.
Halliday et al., 2013 [114]	- Strategy *Let's Make Scotland More Active* is one of few policy documents that was in depth, systematically reviewed in 2008 - *Physical activity policy review*, by the NHS Health Scotland. It was found that more supportive PA policies for elderly should be addressed, And that the strategy should put more focus on inclusion in general, and that there is a gap between action and intent at various levels of government, that is, insufficient resources and political commitment towards PA promotion. The strategy stimulated local development of strategies across the country.
Woods & Mutrie, 2012 [218]	- In 2003, all political parties agreed on *Let's Make Scotland More Active policy.* It was reviewed in 2009 and one of the conclusions was that policy is still relevant and that the targets set for 2022 could be met with refined efforts. For example, adolescent girls and older adults are making slower progress towards achieving the targets. More attention should be given to such population groups.
Brown et al., 2011 [43]	- National policy document *Lets make Scotland more active* was published by the Physical Activity Task Force in 2003.
Pate et al., 2011 [37]	- Policy related to PE in schools states that: children should engage in at least two hours of PE a week; PE should be taught by highly qualified and certified teachers; and PE curriculum should be included in the school review process.

	- PA policy in the area related to community environmental support states that: access to public sports facilities and venues should be free or offered at discounted prices for students; parks, playgrounds, and open spaces that are interesting and challenging for youth and children should be created; community organisations and local authorities should be support, funded, and encouraged to develop PA promotion programmes for families to help them become active and use the existing infrastructure; and cooperation between colleges, youth clubs, and schools with community groups, local authorities, and health professionals should be encouraged to design programmes to increase involvement in PA.. - The data were extracted from the following documents: *Let's Make Scotland More Active: A Strategy for Physical Activity* (2003) and *Five-year Review of 'Let's Make Scotland More Active'—A Strategy for Physical Activity* (by the Scottish Physical Activity Research Collaboration, 2009).
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Let's make Scotland more Active: A Strategy for Physical Activity* (2003), *Improving Health in Scotland* (2003), and *Transport Scotland, framework document* (2005).
Bornstein et al., 2009 [79]	- The document *Let's Make Scotland More Active—a Strategy for Physical Activity* (2003) has the time frame for achieving goals from 2003 until 2022. It aims to increase the population level of PA by one per cent a year. Some of the targeted population groups are: young people and children; adults later in life; and adults.
Musingarimi, 2009 [158] Musingarimi, 2008 [157]	- *Let's Make Scotland More Active—a Strategy for Physical Activity* Some aims to, achieve that by 2022 50% of people (aged 16 years and older) and 80% of children (younger than 16 years) meet recommended PA levels. The progress towards targets is measured with the Scottish Health Survey.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- The Scottish Executive initiates national PA policies and provides funding. In 2003, it launched *Sport 21 2003-2007 shaping Scotland's future* for which Sportscotland is the main implementation agency. The agency promotes the impact of sport on a broader policy agenda, especially in areas of health and social inclusion. - Following a commitment in Government's *White Paper Towards A Healthier Scotland* (1998), in 2001, Scottish Ministers established the National Physical Activity Task Force. - Other PA promotion related documents include: *A Walking Strategy for Scotland* (2003); *Building better Transport* (2003); *Coronary Heart Disease and Stroke Strategy for Scotland* (2002); and *The National Cycling Strategy in Scotland* (1996).
Senegal	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Serbia	
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Lachat et al., 2013 [140]	- In 2010, the Ministry of Health issued the *National programme for prevention, treatment* *and control of cardiovascular diseases in Republic of Serbia till 2020*. - National policy included the following targets and actions for PA promotion: promote PA in adults, elderly, healthy people, patients with cardiovascular disease, children, and adolescents; the NGO and Government campaign "Sport for All"; "institutional organisation of sport and recreative occasions" (e.g. sport activities or recreation for pensioners or workers); implement and promote PA in everyday life at the population level; perform moderate PA as stressed out in the national guidelines; update PA programmes in the school curriculum; educate PA and medical professionals about benefits of PA for patients with cardiovascular disease; and develop and implement cooperation between NGOs and government in the implementation of PA recommendations. - The policy mentioned concrete actions for involvement of private sector in PA promotion.
Seychelles	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Sports Strategic Plan for 2014 -2018* is available.
Singapore	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Physical activity strategy paper* is available.

Pate et al., 2011 [37]	- PA policy in the area related to school environmental support for PA promotion in children and youth states that: access to a broad range of activities such as dance, sports, active travel, play, exercise and being active in daily tasks should be provided around and in school; schools should be encouraged to conduct fitness tests of their students annually and store the collected data; parks around schools and school playgrounds should be designed and renovated to inspire sport, movement, play, and outdoor education; awards should be given to schools for promoting holistic health in the school settings, including the promotion of PA in students, parents, and staff. - PA policy in the area related to community environmental support for PA promotion in children and youth states that: access to public sports facilities and venues should be free or offered at discounted prices for students; parks, playgrounds, and open spaces that are interesting and challenging for youth and children should be created; community organisations and local authorities should be support, funded, and encouraged to develop PA promotion programmes for families to help them become active and use the existing infrastructure; and cooperation between colleges, youth clubs, and schools with community groups, local authorities, and health professionals should be encouraged to design programmes to increase involvement in PA. - The data were obtained from the Health Promotion Board Singapore Government (information provided by co-author, further details not specified).
Slovak Republic	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *National Health Promotion Programme.*
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following policy related to HEPA and sport promotion was identified: *National programme for the development of sport 2001–2010* (2001). It identified PE as one of the seven key focus areas. It mentioned variety of actions such as: the inclusion of disadvantaged children; enabling access to facilities; providing opportunity for children to have three PE lessons per week; ensuring training of teachers; and ensuring quality standards.
World Health Organization, 2010 [12]	- The following national documents, related to PA were identified: *Č.300/2008 Law on the organisation and promotion of sport* (2008); *National programme for sport development* (2001), and *National Health Enhancing Physical Activity Programme* 2007–2012. The first two documents were issued by the Government and the last one was issued by the Ministry of Health. - Since 2001, there has been a coordinating mechanism in the area of PA promotion, with the Ministry of Education as the leading institution. The participating stakeholders are: government departments on sport, health, transport, labour, education, research, and food; communities; and academia.
World Health Organization, 2007 [227]	- There are two main documents dealing with overweight and obesity: *Health state policy* (2006) and the *National health promotion programme*. - The *National programme for sport development* was approved in 2001 by the Government. Some of the main priorities are sports as a leisure activity and PA in schools. A legislative document related to sports is under development.
Slovenia	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Joint Programming Initiative A Healthy Diet for a Healthy Life.*
Sember et al., 2016 [192]	- The assigned grade for the indicator *Government—Strategies, Policies, Investments* from *RC on PA for Children and Youth* is B +. - The Slovenian Parliament adopted the *National Programme of Sport 2014–2023* in 2014 and the *National Programme of Nutrition and Physical Activity for Health 2015–2025* in 2015. - The strategies aim to: provide grounds for the implementation of high-quality, publicly funded, and organised PA programmes at all levels; encourage general population to engage in healthy lifestyles; and raise the quantity and the quality of children and adolescents' PA. The actions proposed in the *National Programme of Sport* include: free cycling and swimming lessons; providing leisure-time for sport activities; and ensuring at least 180 minutes PE per week. - Constant investments in sport infrastructure at all governmental levels are visible in the last two decades. Public funding for sport infrastructure exceeded €300 M in the period from 2001 to 2008.

	- The *Ministry of Education, Science, and Sports* supports the SLOfit monitoring system and uses the evidence to plan its future interventions and activities. - The government's PA intervention programme *Healthy Lifestyle* aimed to combat obesity and decline in children's physical fitness was evaluated and proved to be effective.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *National Health Enhancing Physical Activity Programme 2007–2012,* issued in 2007. - Recommendations are provided for adults only. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities. - The document does not include recommendations on SB.
Bull et al., 2014 [85] [83] [84]	- PE is a mandatory subject from kindergarten to university. - The key document for PA promotion is the *National Health Enhancing PA Programme 2007-2012.* - Other relevant documents related to PA promotion are*: Law of Sport of the Republic of Slovenia* (1998); *National Programme of Sport in the Republic of Slovenia, 2000-2010, Occupational Health and Safety Act* (1999); *Resolution on National Programme of Safety and Health at Work* (2003); Spatial Planning Act (2002, 2007); *Spatial Development Strategy of the Republic of Slovenia* (2004); and *Resolution on the Transport Policy of the Republic of Slovenia 2006* (particularly important for cycling and walking). - There are national PA guidelines for adults only.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The document *National programme on sports* [Nacionalni program športa v Republiki Sloveniji] was published in 2000. It mentions short-term, medium-term, and long-term time frames. It aims at increasing the number of people who regularly engage in sport activities by 2.5 per cent with one per cent increase a year. - Standardisation of sports facilities and the need to provide young people access to use them on a "non-profit basis" have been addressed. Reconstruction or construction of 25,000m^2 of covered space per year is also one of the aims mentioned in the document.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the international assessment of the obesity problem or to the *WHO Global Strategy on Diet, PA and Health.* - The document includes a thorough analysis of PA and eating habits of the population. - The specific quantifiable targets mentioned in the document are: a) for adolescents and children: increase the number of those who engage in PA at least one hour a day by 30% and who cycle and/or walk for transport purposes by 20%, and decrease the number of those with more than four hours of leisure screen time a day by 30%. b) for adults: increase the number of those who are regularly and sufficiently engaged in PA by 20% and who cycle and/or walk for transport purposes by 20%, and decrease the number of those with more than four hours of leisure screen time a day by 30%.
World Health Organization, 2010 [12]	- The *National Health Enhancing Physical Activity Programme 2007–2012* was issued in 2007 by the Ministry of Health. - Since 2007, there has been a coordinating mechanism in the area of PA promotion, with the Ministry of Health and the Ministry of Education and Sport as the leading institutions. The participating stakeholders are government departments on sport, health, research, and education.
World Health Organization, 2007 [227]	- The Ministry of Health prepared a draft of the *National Plan for Physical Activity*. In 2006, it was sent to the Government. - Some of the National Institute of Public Health's initiatives are: *The Healthy Nutrition and Physical Activity for Secondary School Teachers Programme (2004–2005*); *Body Weight for Adolescents and Getting Active (2004-2006)*; and *That's me* – a web site with information for adolescents that includes topics on PA and nutrition.
Solomon Islands	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Lachat et al., 2013 [140]	- National policy (details not specified) includes the following targets and actions for PA promotion: help individuals with disabilities caused by a traumatic injury, disease or other factors to maximise their potential for engaging in PA; and promote maintenance

	of body weight by combining regular PA and balanced diet.
South Africa	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the documents entitled *National Plan for the Prevention and Control of Non-Communicable Diseases 2013-2017* and *National Strategy for the Prevention and Control of Obesity 2015-2020.*
Uys et al., 2016 [208]	- The assigned grade for the indicator *Government—Strategies, Policies*, *Investments* from *RC on PA and nutrition for Children and Youth* is B. - Sports and Recreation South Africa (SRSA) published the *Sports and Recreation South Africa Annual Performance Plan (APP) 2016/17* and mentioned the importance of joint commitment with the Department of Basic Education (DBE) to maximise access to PA, recreation, and sport in all schools. - SRSA and other stakeholders have been actively engaged in ensuring funding and supporting private partnerships to increase the participation in school sport.
Draper et al., 2014 [100] [101]	- The assigned grade for the indicator *Government—Strategies, Policies*, *Investments* from *RC on PA and nutrition for Children and Youth* is B. - *Integrated School Sports Framework* (2011) was launched by the DBE and SRSA and it guides the delivery of sport in all schools by hosting and funding tournaments, providing equipment, and building capacity of trainers. - The *National Sport and Recreation Plan* increased the number of active students at school. - The *Sport and Recreation South Africa strategic plan for the fiscal years 2012 – 2016* mentioned the increase of the school sport investment by SRSA of 18%.
de Villiers et al., 2010 [97]	- The following grades were assigned to the four components of the indicator *Policies, programmes and interventions to promote PA* from *RC on PA, Nutrition and Tobacco use for Children and Youth*: 1) Department of Education's Curriculum and Assessment Policy Statement – the grade "NE" (i.e. "promising initiatives but for which there is no evaluation"). - *Curriculum and Assessment Policy Statements* (2011) mentions fixed periods dedicated to PE in grades 10-12, each week; 2) School based interventions – grade "NE"; 3) Non-motorised transport initiative – grade "NE"; 4) Sport for development initiatives – grade "B".
Reddy et al., 2007 [177]	- The assigned grades for the indicator related to PA promotion *Legislation: Sport and Education* from *RC on PA, Nutrition and Tobacco use for Children and Youth* are B and NE. - A framework document for cooperation was developed in 2005 by the Departments of Education and Sport and Recreation (details not specified). It mentioned several factors that are preventing the transformation of recreation and sport, including: the lack of safe and appropriate facilities and improvement of existing ones; lack of participation in PE by learners and educators; and the fact that population groups such as girls and women, rural communities, and people with disabilities are disadvantaged.
Spain	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Plan Integral de Actividad Fisica y Deporte (Integral Plan for Physical Activity and Sport Promotion)* is available.
Roman-Viñas et al., 2016 [184]	- The iandicator *Government* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete, because the impact of policies on increased PA levels was unclear. - The *Integral plan for Physical Activity and Sport 2010-20* promotes universal access to sport at the population level. It mentions specific policies for PA promotion at the worksite, in school, and in the private and health sectors.
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Rütten et al., 2013 [185]	- The *Spanish Strategy for Nutrition, PA, and prevention of obesity National Strategy on sport and sustainability* issued in 2007 includes public policy related to LTPA. More policies related to LTPA promotion are available at local/regional levels. - Supportive environments for LTPA (indoor/outdoor sport facilities and infrastructure for LTPA) are broadly available. Urban and green spaces usable for LTPA are partially available.
Ceccarelli et al., 2011 [90]	- The identified goals in policies that deal with nutrition, PA, and obesity are general and not quantifiable and measurable (details not specified).

	- The analysed policy document explicitly refers to the international assessment of the obesity problem or to the *WHO Global Strategy on Diet, PA and Health.*
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Integral Plan for Physical Activity and Sport Promotion* (2009); and *Strategy for Nutrition,* and *Physical Activity and Prevention of Obesity* (2005)*.* - Since 2001, there has been a coordinating mechanism in the area of PA promotion, with the Spanish Food Safety and Nutrition Agency, Ministry of Health as the leading institution. The participating stakeholders are: government departments on agriculture, food, health, consumer affairs, education and research, social welfare, and sport; civil society; communities (regional councils); academia; media; and the private sector.
Daugbjerg et al., 2009 [11]	- The *Spanish strategy for Nutrition, Physical Activity and Prevention of Obesity* (2002) does not contain quantifiable PA goals, the time frame, and the budget for policy implementation, but it contains a requirement/intention for evaluation.
Ballesteros Arribas et al., 2007 [70] (in Spanish language)	- *Spanish strategy for nutrition, physical activity and the prevention of obesity* (NAOS strategy) was issued by the Ministry of Health and Consumer Affairs in 2005. The least developed part of the strategy is related to PA. It is more focused on nutrition. It contains the pyramid that for the first time provided combined recommendations on diet and PA, because the authors of the Strategy considered the recommendations on these health behaviours should be delivered as "one message".
World Health Organization, 2007 [227]	- The *Spanish Strategy for nutrition, physical activity and the prevention of obesity* addressed obesity through various working groups that focus on, for example: targets for PA and diet; genetic, environmental and educational determinants of obesity; and scientific research. Some of its key objectives include the promotion of PA and healthy eating and increasing the awareness about how regular PA and balanced diet may affect health. Various stakeholders participated in the consultation process for its development. During the process, the Ministry of Health and Consumer Affairs signed various cooperation agreements with the private sector.
Sri Lanka	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Lachat et al., 2013 [140]	- In 2004, Sri Lanka Inter Ministerial Committee on Food Security issued the *Food and nutrition policy of Sri Lanka, 2004–2010*. - National policy includes the following targets and actions for PA promotion: reactivate the young farmers club and sports and youth clubs to promote PA; raise awareness of PA; promote higher amount of PA among school children and adults to minimise the risk of chronic degenerative diseases; develop awareness programme on the importance of PA for the employees in institutions and promote the messages about the importance of PA through the mass media; supply facilities for outdoor recreation PA; and invest in road safety for cyclists and pedestrians.
St. Kitts and Nevis	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
St. Lucia	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
St. Martin (French part)	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
St. Vincent and the Grenadines	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Strategic Plan of Action for the Prevention and Control of Non-communicable diseases for countries of the Caribbean Community 2011-2015.*
Swaziland	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Sweden	
Coenen et al., 2017 [38]	- The document *Swedish Guidelines on Call Centre Workplaces*, issued by the

	Government's Work Environment Authority in 2007, includes the recommendation to alternate between standing and sitting to reduce occupational SB.
Nyström et al., 2016 [161] [162]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is B. - *Nordic Nutrient Recommendations* provide guidelines for children and adults on diet, nutrition, and PA levels. Specific recommendations on SB are not provided. It is only recommended to reduce the amount of time spent in SB. - In 2009, the Swedish Sports Confederation issued *Sports for Life – Strategic Plan for the Sport Movement's Public Health Work* and *Sports Wants – Policy Programme of Ideas*.
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical activity. In: Nordic Nutrition Recommendations 2004 Integrating nutrition and physical activity,* issued in 2004 by the Nordic Council of Ministers. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people. - The document does not include recommendations on SB.
Kalman & Hamrik, 2013 [128] (in Czech language)	- In a policy document (details not specified) related to PA it is mentioned that special emphasis needs to be put on environmental conditions for children and youth, considering their socioeconomic status, gender, and ethnic background. It is stated that the interest for LTPA has increased in the last decade, but low levels of PA related to workplace and transport have not been addressed properly.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the WHO Global Strategy on Diet, Physical activity and Health or to some other document assessing the problem of obesity. - Sports goods manufacturers and advertising and recreation businesses were mentioned in the policy document as the stakeholders related to PA and sport.:. - *Health, food and physical activity: Nordic Plan of Action on better health and quality of life through diet and physical activity* was issued by the Nordic Council of Ministers in 2006. The document established a number of common goals and the policy agenda for all Nordic countries, although individual countries have adopted "partly different sets of actions within the designated areas of common priority".
Pate et al., 2011 [37]	- PA policy measures were found in the following areas: a) PE in school (e.g. requirement of at least two hours of weekly PE for all children that should be taught by highly qualified and certified teachers); b) health education (e.g. enable training for healthcare professionals in schools in motivational interviewing techniques related to PA, establishment of cooperation with universities to provide teacher education classes for inclusion of the *PA and Health* topic into the curriculum); c) school environmental support (e.g. provide access to a broad range of activities such as dance, sports, active travel, play, exercise, and being active in daily tasks around and in schools, award schools for promoting holistic health in the school setting, including the promotion of PA in students, parents, and staff. - The data were extracted from the *Background Material to the Action Plan for Healthy Dietary Habits and Increased Physical Activity* published by the Swedish National Food Administration and National Institute of Public Health in 2005.
Bornstein et al., 2009 [79]	- In the *Background Material to The Action Plan for Healthy Dietary Habits and Increased Physical Activity* timeline for achieving goals was not identified. The target groups include, for example: elderly; children; and people with immigrant backgrounds. Some of the targets are: increase the number of healthy adults who engage in at least 30 minutes of moderate PA every day or in total 3.5 hours of moderate PA per week; and increase the number of healthy children who engage in moderate PA for at least 60 minutes every day or in total for seven hours per week.
Branca et al., 2007 [80]	- *Background material to the action plan for healthy dietary habits and increased physical activity* was published in 2005 by the National Institute of Public Health. It is a comprehensive document, containing 79 detailed measures with the description of responsible stakeholders, rationale for the measures, and in some cases the cost estimates. It proposes to establish a consortium with representatives from different

	research councils to initiate intervention research on diet and PA. It also focuses on housing policy, because it can have major effects on PA and public health.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Government Bill: future outdoor recreation, 2009/10:238* (2010); *A renewed public health policy* (2008); *Future travel and transport – infrastructure for sustainable growth* (2008); *Nordic Plan of Action on better health and quality of life through diet and physical activity* (2006); *Action Plan for healthy dietary habits and increased physical activity* (2005); *Sweden's environmental policy: Environmental Quality Objective 15 – A good built environment* (2005); *Sweden's new public health policy* (2002); *The will of sports* (issued in 1995, updated in 2005 and 2009); and *Physical education and health* (1995). - Since 2001, there has been a coordinating mechanism in the area of PA promotion, with the Swedish National Public Health Institute and the Swedish National Centre for Child Health Promotion as the leading institutions. The participating stakeholders are: government departments on sport and health; communities; NGOs; and the private sector.
Daugbjerg et al., 2009 [11]	- The policy document entitled *Sweden's new public health policy— National public health objectives for Sweden* (2003) does not contain quantifiable PA goals, the time frame, the budget for policy implementation, and a requirement/intention for evaluation. From all the abovementioned components, the document *Healthy dietary habits and increased physical activity—the basis for an action plan* (2005) contains only a requirement/intention for evaluation.
World Health Organization, 2007 [227]	- *Sweden's new public health policy: national public health objectives for Sweden*, published in 2003, deals with both nutrition and PA and mentions increased PA as one of its 11 target areas. The policy highlights the significance of 'good sports policies that enhance opportunities of people to exercise and engage in sports activity. PA in preschools and schools is seen as crucial. It is stated that the area of health and sports should develop new working methods that encourage and allow all children to participate in PA and that PA during working hours is also of great importance.
Van Mechelen in Simonopoulos (ed.), 1997 [210]	- There are no national policies for the promotion of PA or physical fitness. A national programme is in development, whilst some local initiatives for promotion of active lifestyle are already in place.
Switzerland	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *National Programme on Diet and Physical Activity* is available.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Physical activity and health-what are the recommendations and where do we find the Swiss population?,* issued in 2009. - Specific recommendations are provided for children/young people and adults. - The PA recommendations are not fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for children/young people and adults. - The document includes recommendations on SB for children/young people.
Bull et al., 2014 [85] [83] [84]	- *The Freedom to Roam* (1907) and *Federal Law on Walking and Hiking Paths* (1985) are important parts of historic legislation related to transport and environment. The *Mission statement on human powered mobility* (only a draft document) aims to increase physically active transport in the next ten years by 15%. - *The Federal Law on the Promotion of Gymnastics and Sport* (1972) besides sports covers also the provision of PE. - *Concept of the Federal Council for a Sports Policy in Switzerland* (2000) set the target of increasing the number people who engage in PA by 1% per year from 2003 to 2006. - The *National Programme on Diet and Physical Activity* 2008-2012 does not include an action plan. - National HEPA recommendations for adults and children were issued in 1999 and in 2006, respectively.
Bellew et al., 2011 [8]	- The *Youth+Kids* programme targets elementary school children. - The *Switzerland Mobility* programme provides national tourism offers for cycling, hiking, leisure-orientated walking, and other activities.
Ceccarelli et al., 2011 [90]	- The analysed policy document (details not specified) explicitly refers to the *WHO Global Strategy on Diet, Physical activity and Health* or to some other document assessing the problem of obesity.

	- The document includes a thorough analysis of PA and eating habits of the population.
World Health Organization, 2010 [229]	- *The Swiss Nutrition and Physical Activity Monitoring Programme* was set up to be in effect from 2007 to 2013. Under the programme, the Federal Office of Public Health launched an *Action santé* initiative. The three key principles of the initiative were subsidiarity, openness, and action. The key goal of the initiative was to improve people's quality of life by enabling them to live in an environment that is health-promoting and suitable for the implementation of healthy lifestyles, including a healthy diet and sufficient PA. The initiative has four key action areas, including: advertising and marketing; food composition; consumer information; and "the promotion of an environment conducive to physical activity". - Intersectoral cooperation is enabled through involvement of non-health departments, for example, the Sport and Transport Department.
Daugbjerg et al., 2009 [11]	- The document *Mission statement on human powered mobility—English summary* (published 2002, with the time frame until 2004) contains quantifiable PA goals, the budget for policy implementation, and a requirement/intention for evaluation. *Concept of the Federal Council for a sports policy in Switzerland* (2000) does not contain quantifiable PA goals, time frame and budget for policy implementation, but it does contain a requirement/intention for evaluation.
World Health Organization, 2007 [227]	- *Concept for a national sports policy* was issued by the Federal Council in 2000. It mentions the foundations for the political contribution in creation of PA culture, where sport is an integral part of an economic, ecological, social, and sustainable development. - The Health Promotion Switzerland and the Swiss Federal Office of Public Health launched the joint *Suisse Balance* programme. Its two key goals are to: increase the proportion of people with healthy weight through healthy diet and PA; and develop the structural conditions necessary for the stable development of population's healthy body weight by 2010. It mainly targets children and youth and it encourages the development of national, regional, and local, projects that promote healthy behaviour through PA and nutrition.
Cavill et al, 2006 [89]	- The Swiss Confederation was responsible for sports promotion, including "sport promotion to improve public health", since 1972. - The *Concept for a National Sports Policy in Switzerland* was accepted by the Federal Government in 2000 and its first main objective was "more physically active people". - *Youth+Sports* is a national programme for 10-20 year olds, which has been in place for over 30 years and receives more than 40% of the Federal Office of Sports' budget.
Bull et al., 2004 [26] Schöppe et al., 2004 [187] Bull et al. in Bull et al., 2004 [86]	- The following agencies are responsible for national PA policies: the Swiss Federal Office of Public Health; the Swiss Federal Department of Defence; Civil Protection and Sport; and the Health Promotion Unit (under the Swiss Federal Office of Sports). The Health Promotion Unit is perceived as a national centre for HEPA. Guidelines for evaluating and developing activities in the HEPA promotion were published and summarised in the *PA pyramid*. - The key documents that define PA as a priority area are a strategy document *HEPA Promotion in Switzerland* and the *Swiss Federal Government's Concept for a National Sport Policy.* Both documents were published in 2000. Other documents that address PA promotion are*: Policy and Strategy Document for the Promotion of Cycling and Walking with a particular Focus on Children: Transport related Health, Impacts – Costs and benefits with a particular focus on children* (2003) and the *Action Plan Environment and Health* (2001).
Syrian Arab Republic	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Tajikistan	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
World Health Organization, 2007 [227]	- The programme on PA and diet was recently developed (details not specified). - Policy on obesity prevention is to be developed.
Tanzania	

Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Thailand	
Amornsriwatanakul et al., 2016 [67] [68]	- The assigned grade for the indicator *Government Strategies, Policies, and Investments* from *RC on PA for Children and Youth* is C. - The documents related to PA are the *Thailand Healthy Lifestyle Strategic Plan 2011-2020*, issued by the Ministry of Public Health, and the *National Physical Activity Plan*, issued by the Ministry of Public Health, the Division of Physical Activity and Health. - The Ministry of Tourism and Sport allocated resources for the implementation of recreational and sport programmes and for building infrastructure to promote children's health. - The Government's investments and policies related to PA do not focus on children and existing plans usually do not highlight PA but mainly rather sports and exercise. - It is recognised that PA policy and physical environments may be some of the reasons why levels of children's PA are low.
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Pate et al., 2011 [37]	- Policy related to PE in schools states that: access to a broad range of activities such as dance, sports, active travel, play, exercise, and being active in daily tasks should be provided around and in schools; schools should be encouraged to conduct fitness tests of their students annually and store the collected data; parks around schools and school playgrounds should be designed and renovated to inspire sport, movement, play, and outdoor education; awards should be given to schools for promoting holistic health in the school settings, including the promotion of PA in students, parents, and staff. - The data were obtained from the Thai Health Promotion Foundation (information provided by co-author, further details not specified).
Tonga	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Trinidad and Tobago	
Ramirez Varela et al., 2016 [32]	- A national or subnational PA plan is available (details are not specified).
Tunisia	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Turkey	
Ramirez Varela et al., 2016 [32]	- PA is mentioned in the document entitled *Turkey Healthy Nutrition and Active Life Programme (2014 – 2017).*
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled the *Obesity prevention and control programme of Turkey (2010–2014),* issued in 2010. - Recommendations are provided for adults only. - The PA recommendations are not fully aligned with the WHO recommendations. - The document does not include recommendations on muscle-strengthening activities. - The document does not include recommendations on SB.
Lachat et al., 2013 [140]	- In 2010, the General Directorate of Primary Health Care, Ministry of Health issued the *Obesity prevention and control programme of Turkey 2010–2014*. - National policy includes the following targets and actions for PA promotion: establish mainstream obesity fighting strategies in the national health strategies and policies; provide accurate information to the public by written and visual media on obesity and active life; establish provincial coordination centres in 81 provinces (Obesity Prevention, Nutrition, and Active Life); increase the level of knowledge about PA at worksites; develop national PA guidelines; improve programme related to PA and PA-related environment in the educational system; build recreational areas and sports facilities to make PA widespread, with the leadership of the local administration; and develop "PA applications that can be easily applied inside the house". - The policy includes concrete actions for the involvement of private sector in PA promotion and it highlights the need for urban planning and sports infrastructure.

World Health Organization, 2007 [227]	- *The National Plan of Action for Food and Nutrition* covers the period from 2002 to 2010. - The National Food and Nutrition Committee was established to implement and coordinate the realisation of the National plan. The Committee consists of the representatives from the Ministry of Agriculture, the Ministry of Education, and the Ministry of Health, as well as from nongovernmental organisations, universities, private sectors, and production sectors. The Committee is composed of different working groups. One of the working groups deals –is entitled *Prevention of obesity and chronic diseases related to obesity and encouraging an active lifestyle*. The Committee started its work in the fields of obesity and PA and will develop recommendations on advertising aimed at children.
Tuvalu	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Turkmenistan	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
Uganda	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Ukraine	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Physical Activity - Health Lifestyle - Healthy Nation 2025* is available.
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
United Arab Emirates	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Zaabi et al., 2016 [223] [224]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is B+. - Government demonstrated commitment and leadership in providing PA opportunities for all youth and children and invested significant funds in PA promotion programmes for children and adults (e.g. redesigning the transport infrastructure and improving the urban environment). - Since 2010, PE classes are obligatory in all schools, from year one (kindergarten) to year 12 (high school). - As one of the goals, the document *UAE Vision 2021* stressed out achieving the status of a world-class healthcare system with major performance indicators related to PA (e.g., reduction of the prevalence of obesity among 5-17 year olds by 12% by 2012).
World Health Organization, 2014 [232]	- A national policy document related to PA in the health sector was not identified. - Other findings from this study related to PA policy in United Arab Emirates are related to local level (*Dubai Sports Strategy*, *Dubai Pulse*).
United States of America	
Coenen et al., 2017 [38]	-The *Physical Activity Guidelines for Americans*, issued by the Department of Health and Human Services in 2008, do not include recommendations on SB.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *US National Physical Activity Plan* is available.
Guo&Pan, 2016 [113] (in Chinese language)	- The recent history of PA policy in the USA had five turning points. - The first three turning points relate to PA recommendations issued by professional organisations (by the American College of Sports Medicine in 1990; by the American Heart Association in 1992; and by the American College of Sports Medicine and the Centres for Disease Control and Prevention in 1995). - The fourth turning point relates to the development of the *Physical Activity Guidelines for Americans* in 2008. These were the first PA guidelines issued by the Federal Government. - The fifth turning point relates to the development of the *National Physical Activity Plan* in 2010, with the core objective to change the social environment (e.g. communities, schools, and media).
Gomez, 2015 [108]	- The *Federal Obesity Prevention Act*, issued in 2008, required responsible agencies to

	evaluate how their budgets impacted nutrition, PA, and obesity in the population. - The *Let's Move!* Campaign, started in 2010 by the First Lady Obama, mentions increase in population PA as one of its 4 goals. The programme was continued in 2012 under the name *Let's Move! Cities, Towns, and Counties initiative*. - Some of the obesity prevention initiatives enacted by the Congress in the period from 2007 to 2009 include *the National Physical Education and Sports Week*, and *National Youth Sports Week*.
Katzmarzyk et al., 2016 [133] [134]	- The indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete, because of insufficient data were available for robust benchmarking. - There are no guidelines related to SB. - The national initiative *Let's Move! Active Schools* provides schools with tools, funding opportunities, resources, technical assistance, and professional development to create an active school environment where PA is integrated during, after, and before school, for at least 60 minutes per day.
Bornstein et al., 2014 [78]	- The *National Physical Activity Plan for the United States* was issued in 2010. It was developed through public-private partnerships. It involved government agencies, but it was not driven by the federal government, because its creators did not want to tie it to any political administration.
Bornstein & Pate, 2014 [77]	- The *Physical Activity Guidelines for Americans* were released in 2008. - As the Department of Health and Human Services was completing the guidelines, representatives from the Centers for Disease Control and Prevention and PA and public health researchers and practitioners reached an agreement on the necessity of a national PA plan for the USA. - The *National Physical Activity Plan for the United States* includes 52 evidence-based strategies and 215 tactics for increasing population PA levels.
Dentro et al., 2014 [98] [99]	- The indicator *Government Strategies and Investment* from *RC on PA for Children and Youth* did not receive a grade. It was marked as incomplete, because there were no benchmarks or data to inform the assessment of the indicator. - The National Physical Activity Plan Alliance is a comprehensive set of initiatives, policies, and programmes aiming to increase PA in the general population. - Besides PA guidelines, important PA promotion initiatives include: *President's Council on Fitness, Sports, and Nutrition;* the *Federal Safe Routes to School Program*; the *Community Transformation Grant Program*; *Let's Move!*; and *NHANES National Youth Fitness Survey.*
Xu et al., 2014 [220] (in Chinese language)	- The first *Heathy People:*[11]*The Surgeon General's Report on Health Promotion and Disease Prevention* strategy, issued in 1979, mentioned negative health effects of prolonged sitting. - The second strategy *Heathy People 1990: Promoting Health/Preventing Disease: Objectives for the Nation* introduced PA as a component of a healthy lifestyle. - The third strategy *Heathy People 2000: National Health Promotion and Disease Prevention Objectives* mentioned PA as one of the key priority areas. - The fourth strategy, *Heathy People 2010*, and the fifth strategy, *Heathy People 2020:* mentioned PA as a leading health indicator and specified detailed objectives regarding population PA. - This initiative has a high level of sustainability because it is constantly improving, its objectives are measurable, and it has a good and interactive on-line platform. It is a result of a joint effort of different stakeholders and PA is perceived as one of the main indicators for health benefits.
Bellew et al., 2011 [8]	- The *Coordinated Approach to Childhood Health* school programme was established to promote healthy food choices and PA in school children.
Brown et al., 2011 [43]	- The use of *Physical Activity Guidelines for Americans*, issued by the US Department of Health and Human Services in 2008, is strongly recommended according to the Appraisal of Guidelines for Research and Evaluation quality grading (AGREE tool).
Eyler, 2011 [103]	- The *Healthy People 2020* strategy includes two goals related to PE: increase the number of students who participate in PE daily; and the increase number of schools that require daily PE.

[11] A wrong translation of the programme name (*Healthy Citizen* instead of *Healthy People*) was used in the paper.

	- The strategy also includes a developmental goal to "increase legislative policies for the built environment that aim to enhance access to and availability of physical activity opportunities". - The importance of active transport has also been emphasised in the strategy. The stated goals are to increase the number of adolescents and children (5-15 y.o.) that walk or cycle to school. These policies were financially supported by the *National Safe Routes to School Program*, Federal Highway Administration.
Oja & Titze, 2011 [234]	- In the document *Physical Activity Guidelines for Americans*, issued by the Department of Health and Human Services in 2008, there are specific recommendations for the following population groups: adults with disabilities; children and adolescents (6-17 y.o.); adults (18-64 y.o.); older adults (more than 65 y.o); and women during and after the pregnancy.
Pate et al., 2011 [37]	- Policy related to PE in schools states that: children should engage in at least two hours of PE a week; PE should be taught by highly qualified and certified teachers; and PE curriculum should be included in the school review process. - PA policy in the area related to health education states that: cooperation with universities should be established to provide teacher education classes for inclusion of the *PA and Health* topic into the curriculum; training in motivational interviewing techniques related to PA should be provided to healthcare professionals in schools; the promotion of PA for achieving health benefits should be incorporated in health education classes; and education should be provided to parents to encourage them to regularly engage in PA and to be positive role models for their children. - The data were extracted from the document *Physical Activity and Health: A Report of the Surgeon General,* published by the Department of Health and Human Services in 1996.
Koh, 2010 [136] (in Korean language)	- The *Physical Activity Guidelines for Americans*, issued by the Department of Health and Human Services in 2008, include recommendations on PA and mention that inactivity should be avoided and that some PA is better than none.
Alderman et al., 2007 [65]	- In the Government report *Exercise and Health*, issued in 1915, it was mentioned that Americans were too sedentary and the Government encouraged citizens to be more active, that is, at least 20 minutes per day. - In 1980s, the Government started to promote cycling and walking because it became obvious that engaging daily in exercise is unrealistic for many people. - Important acts that address obesity and mention PA that have not yet become laws are: a) The *Lifestyles and Prevention America Act* (HeLP America Act) – "A bill to improve the health of Americans and reduce health care costs by reorienting the Nation's health care system toward prevention, wellness, and self-care"; and b) The *Improved Nutrition and Physical Activity Act* (IMPACT Act) – "A bill to establish grants to provide health services for improved nutrition, increased physical activity, obesity and eating disorder prevention, and for other purpose".
Uruguay	
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Plan Nacional de Actividad Fisica para la Salud* is under development.
Lachat et al., 2013 [140]	- In 2011, the Ministry of Health issued the national programme on nutrition entitled *Programa nacional prioritario de nutricion 2005–2009*. - The programme includes the following targets and actions for PA promotion: achieve the recommended average of one hour of moderate PA per day for children and adolescents and 30 minutes of moderate PA a day for adults; and develop population-level guidelines for "PA and lifestyle".
Uzbekistan	
World Health Organization, 2010 [229]	- Policy documents in the PA area are not yet available.
Kahlmeier et al., 2015 [127]	- National PA recommendations have not yet been developed.
Vanuatu	
Kobayashi et al, 2017 [135]	- The document *National Physical Activity Development General Policy Directives 2007–2011: Key Policy Areas and 5 Years National Physical Activity Development Targets,* issued in 2007 by the Ministry of Youth Development and Training defined

	four key policy objectives and areas: carry out mapping and assessment of sports development resources; develop, facilitate, and review the implementation of specific policies related to protecting and promoting the "'right' of equal access and participation in physical activities, healthy and safe environment"; undergo resourcing, capacity development, and restructuring of the Ministry; and continue to develop and build partnership and cooperation with the international and national sports partners. The document promotes the development of "PA for all" as a key tool for the social and economic development in the country, through facilitation of programmes that promote employability, social cohesion, good health, and teamwork. - The implementation of sports policy is mainly the responsibility of The Ministry of Youth Development and Training and the Vanuatu Sports Association and National Olympic Committee (VASANOC). - It is obligatory for secondary and primary school students to take PE lessons. - Sport policy has the three major components: social development through sport; development of sport to encourage youth to regularly participate in PA; and elite sports development. Despite sport being relatively low on the Government's priority list compared to other public policy areas, there is a growing interest in the first component of the sport policy.
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Venezuela, RB	
Herrera-Cuenca et al. 2016 [122] [123]	- The assigned grade for the indicator *National Level Policies* from *RC on PA for Children and Youth* is D. - The national-level policies for PA promotion are: the *Constitution of the Bolivarian Republic of Venezuela* (which mentions the right to perform PA in article 111 and emphasises role of state in providing resources for promotion of recreation and sport); *The Organic Law of Sports, Physical Activity and Physical Education*, and the *National Fund for the Development of Sport, Physical Activity and Education Physics.* - The national policy lacks "specific and articulated actions". - An outdoor gyms proposal has been adopted by the Ministry of Popular Power for Youth and implemented by the National Sports Institute.
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Plan Nacional de Deporte, actividad fisica y Educacion Fisica 2013-2025* is available.
Vietnam	
Ramirez Varela et al., 2016 [32]	- NCD plan includes PA (details are not specified).
Lachat et al., 2013 [140]	- In 2012, the Vietnamese Prime Minister issued the *National nutrition strategy for 2011–2020, with a vision toward 2030*. - The national policy includes target/action for PA promotion related to the development of physical exercise programmes at all educational levels, from the preschool to the undergraduate level).
Virgin Islands (U.S.)	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
Wales	
Coenen et al., 2017 [38]	- In the publication *Start active, stay active - A report on physical activity for health from the four home countries' chief medical officers*, issued by the Government's Department of Health in 2011, it is stated that "all adults should minimise the amount of time spent being sedentary (sitting) for extended periods".
Ramirez Varela et al., 2016 [32]	- The PA plan entitled *Creating an Active Wales* is available.
Tyler et al., 2016 [207] Stratton et al, 2016 [198]	- The assigned grade for the indicator *National Government Policy, Strategies and Investments* from *RC on PA for Children and Youth* is B-. - Key documents that mention PA include: *Every Child Hooked on Sport*; *The Right to Play*; *Healthy Schools*; *Future Generations*; *Together for Health* (a 5-year strategy); and *Our Healthy Future.* - The PA policies have not resulted in increased PA levels in the last ten years. - Reducing sedentary time is not mentioned in the documents.
Kahlmeier et al., 2015 [127]	- The national PA recommendations were published in the document entitled *Physical Activity, Health Improvement and Protection. Start Active. Stay Active: A report on*

	physical activity from the four home countries', issued in 2011. - Specific recommendations are provided for children/young people, adults, and older adults. - The PA recommendations for children/young people and adults are fully aligned with the WHO recommendations. - The document includes recommendations on muscle-strengthening activities for adults and older adults and recommendations on SB for children/young people, adults, and older adults.
Christiansen et al., 2014 [44] World Health Organization, 2011 [231]	- The following two documents related to HEPA and sport promotion were published in 2005: *Framework for the development of sport and physical activity* (action plan issued by the Sports Council Wales) and *Climbing higher – Welsh Assembly strategy for sport and physical activity.* In this study, the two policy documents were referred to as a single strategy - The strategy mentioned that people who are physically active are essential for the health of the nation. It is one of the rare strategies that have specific, measureable, achievable, relevant, and time-bound targets. Some of the targets include: all primary school children will participate in PA and sport for at least 60 min, five times a week; at least 90% of secondary school children will participate in PA and sport for at least 60 minutes, five times a week; in the next twenty years, Wales will match the best global standards for PA and sport levels.
Stratton et al., 2014 [199]	- The assigned grade for the indicator *National Policy, Strategy, and Investment* from *RC on PA for Children and Youth* is B. - Some of the key documents that include PA are: *Climbing Higher*; *Creating an Active Wales*; *Sport Wales*; *Play Wales*; *Active Travel Wales Act*; *Turning Heads*; *Sustrans*; *and Food and Fitness.*
Brown et al., 2011 [43]	- The national policy document *Climbing Higher – The Welsh Assembly Government Strategy for Sport and Physical Activity* was published by the Welsh Assembly Government in 2005.
World Health Organization, 2010 [12]	- The following national documents related to PA were identified: *Healthy Ageing Action Plan for Wales* (2005); C*limbing Higher, the Welsh Assembly Strategy for Sport and Physical Activity* (2005); *Framework for the development of sport and physical activity* (2005); *Walking and cycling strategy for Wales* (2003); and *Welsh Assembly Government's Play Policy* (2002).
Musingarimi, 2009 [158] Musingarimi, 2008 [157]	- The national PA-related documents are: *Food and Fitness – Promoting Healthy Eating and Physical Activity for Children and Young People in Wales: 5 Year Implementation Plan* and *Climbing Higher: The Welsh Assembly Government Strategy for Sport and Physical Activity* (2005). The latter document sets a strategy for PA and sport promotion for the next twenty years.
West Bank and Gaza	
Ramirez Varela et al., 2016 [32]	- No national/subnational PA plan.
World Health Organization, 2014 [232]	- There is a national NCD strategic plan or a policy that includes goals focused on PA (details not specified). - There is an NCD committee that also coordinates PA promotion. - There is legislation that mentions the requirements for the PE curriculum across different school grades. - National policy documents cover the general population, children, and young people. - Settings covered by national policy documents are: primary schools; high schools; primary health care; and sport and leisure.
Zimbabwe	
Manyanga et al., 2016 [150] [151]	- The assigned grade for the indicator *Government Strategies and Investments* from *RC on PA for Children and Youth* is D. - The Ministry of Sports and Recreation has drafted *National Sports and Recreation Policy* (unpublished report from 2015). - The *Sports and Recreation Commission Act* mentioned several PA-related goals, such as: monitor training programmes for sports persons; ensure that all people have opportunities to engage in recreation and sport; and develop recreational facilities. - The Sports and Recreation Commission was established in 1991. It has set priorities for the organised sport promotion. - More government commitment, evaluation, monitoring, and resource allocation for

	policies and strategies are needed.

Appendix B4: Additional file 4: Summary results of studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies: international findings

Study	Countries included	Summary findings
Branca et al., 2007 [80]	19 European countries, including: Bulgaria, Croatia, Denmark, Estonia, Finland, France, Georgia, Hungary, Ireland, Latvia, Lithuania, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Turkey, and the United Kingdom	- Only a few countries had specific goals for PA or obesity, but most of the countries had nutrition-related goals. - Most countries are addressing the obesity problem through various strategies. - Obesity prevention strategies share the common goal of changing the school environment by providing a good platform for PA participation and improving health education. - Eight documents propose building safe cycling and walking paths, reducing car use, and efficient public transport. - Many countries included universities, research institutes, and associations of health professionals in the policy development.
Bellew et al., 2008 [6]	Australia Brazil, Canada, Finland, the Netherlands, New Zealand, Scotland, and Switzerland	Regarding PA policy development: - all countries undertook broad consultation processes with key stakeholders from various sectors; - all countries attempted to integrate PA policy with other national policies; - all countries incorporated multiple strategies; "particularly multiple individual-oriented components, and to a lesser extent, environmentally-focused interventions"; - all countries had some monitoring of PA through national-level surveys in place; - a systematic approach for evaluation and monitoring of the PA policy implementation has not been established in any of the countries; - some countries developed clear branding or identity of the initiative.
Ceccarelli et al., 2011 [91]	34 countries from the Organisation for Economic Cooperation and Development and the EU, including: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Iceland, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Turkey, and the United Kingdom[12]	- Obesity is considered a key public health issue in all the countries. - To tackle the problem of obesity, specific population groups were targeted in all the countries. The emphasis was put on children. - Policies to improve healthy nutrition and promote PA were adopted in most of the countries. - The countries of the WHO European region have policies to combat obesity that are mainly focused on food and nutrition practices, whilst only a few policies are related to PA.

[12] Some documents from Malta, Cyprus, Latvia, Germany, Romania, Lithuania, Slovakia, Turkey, and Poland may not have been included in the analysis, because they were not written in English.

		- Quantifiable aims related to PA were set by only a few countries. - Thorough analyses of population PA are present in policies from only eight countries.
Christiansen et al., 2014 [44] World Health Organization, 2011 [233]	15 countries, including: Belgium, Bulgaria, Czech Republic, Estonia, Finland, Hungary, Ireland, Latvia, Lithuania, Malta, the Netherlands, Poland, Slovakia, Slovenia, and the United Kingdom	All analysed strategies (*n* = 18) mentioned: - health benefits of sport; - infrastructure as one of the important factors for population PA; - children, young people, and people with disabilities as target groups; - that the ministry responsible for sport has the responsibility for the implementation; - the importance of "local-level involvement with regard to different aspects" and local-level implementation; - schools as an important setting for PA and sport promotion in children and young people; - health enhancing physical activity (HEPA); - overall objectives of participation in PA and sport.
Daugbjerg et al., 2009 [11]	14 European countries, including: Czech Republic, Denmark, Finland, Germany, Hungary, Iceland, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom (England)	- One or more ministries were involved in the development of all the analysed documents. The implementation plan was emphasised in all the analysed documents. - All analysed documents were legally non-binding. - All analysed documents were published after 2000. - Plans for the implementation of the policies were described in most of the analysed documents. - Most policy documents targeted the whole population - Few analysed documents targeted specifically people with low level of PA and people with disabilities. - Only six documents included quantified PA goals. - Most documents specified timeframes for the policy implementation. - Less than a half of the documents indicated budgets for the policy implementation. - Most of the documents highlighted the importance of evaluation plans and surveillance systems for monitoring the policy implementation. - Only a half of the policies included a requirement/intention for evaluation.
Hämäläinen et al., 2015 [117] Aro et al., 2016 [69]	6 countries, including: Denmark, England, Finland, Italy, the Netherlands, and Romania	- The policy documents lacked the use of evidence from "citable research" (i.e. book chapters, journal articles, working papers, and reports produced by universities, research institutes, and other independent research units). In the policy documents evidence from the following sources was

		rarely used: research based on surveys; peer-reviewed research articles; and evaluation, monitoring, and implementation studies. - Research evidence that was used in the policy documents "was identified in an ad hoc manner in the policymaking phase and consisted of epidemiological research, population studies or statistics, and case studies". - In the policy documents, "implicit evidence" (e.g. common knowledge, facts, and practices) was primarily used. - Most of the analysed countries do not have "routine reporting mechanisms for policy decisions using research evidence during the policymaking process". - The use of evidence in policymaking seems to depend on how close are the contacts between policymakers and researches. - Research evidence was more used when developing policy at the local level than at the national and regional levels.
Ramirez Varela et al., 2017 [178]	139 countries, including: American Samoa, Angola, Antigua and Barbuda, Argentina, Aruba, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Bermuda, Bhutan, Bolivia, Botswana, Brazil, Brunei Darussalam, Bulgaria, Cameroon, Canada, Cayman Islands, Chile, China, Colombia, Costa Rica, Croatia, Cuba, Czech Republic, Denmark, Dominica, Dominican Republic, Ecuador, Egypt, Arab Rep., England, Estonia, Faeroe Islands, Fiji, Finland, France, French Polynesia, Germany, Ghana Greece, Greenland, Grenada, Guam, Guatemala, Guyana, Haiti, Hong Kong, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Korea, Rep., Lao PDR, Lithuania, Luxemburg, Macao SAR, China, Macedonia, FYR, Malaysia, Maldives, Malta, Marshall Islands, Mexico, Micronesia, Fed. Sts., Moldova, Mongolia, Mozambique, Myanmar, Nepal, the Netherlands, New Caledonia, New Zealand, Nicaragua, Nigeria, Northern Ireland, Northern Mariana Islands, Norway, Oman, Palau, Palestine/West Bank and Gaza, Papua New Guinea, Paraguay, Peru, Poland, Portugal, Puerto Rico, Qatar, Romania, Russian Federation, Rwanda, Samoa, Saudi Arabia, Scotland,	- Almost a half of the 139 analysed countries had plans related to NCDs that included PA. - Standalone PA plans were found in 37 countries. - No country in Middle East and North Africa, South Asia, and Sub-Saharan Africa had a standalone PA plan. - Europe and Central Asia have the highest proportion of standalone PA plans. - Sub-Sharan Africa is the region with the highest proportion of countries without PA plans.

	Senegal, Seychelles, Singapore, Slovak Republic, Slovenia, Solomon Islands, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Martin (French part), St. Lucia, St. Vincent and the Grenadines, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tanzania, Thailand, Tonga, Trinidad and Tobago, Tunisia, Turkey, Tuvalu, Uganda, Ukraine, United Arab Emirates, the United States of America, Uruguay, Vanuatu, Venezuela, RB, Vietnam, Virgin Islands (U.S.), and Wales	
Tremblay et al., 2016 [34]	38 countries, including: Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, England, Estonia, Finland, Ghana, Hong Kong, India, Ireland, Japan, Kenya, Malaysia, Mexico, Mozambique, the Netherlands, New Zealand, Nigeria, Northern Ireland, Poland, Portugal, Scotland, Slovenia, South Africa, South Korea, Spain, Sweden, Thailand, United Arab Emirates, the United States of America, Venezuela, Qatar, Wales, and Zimbabwe	- For *Government Strategies and Investments* indicator, out of all the countries Denmark had the highest grade ("A- "), followed by Slovenia and the United Arab Emirates (both with grade "B+"). - Twelve countries reported grades in the "B" range. - Six countries did not assign grades for this indicator. - Most countries reported good governmental PA policies and strategies, but several indicated the lack of implementation, evaluation, and quality assurance.
Tremblay et al., 2014 [33]	15 countries, including: Australia, Canada, Colombia, England, Finland, Ghana, Ireland, Kenya, Mexico, Mozambique, New Zealand, Nigeria, Northern Ireland, Scotland, South Africa, and the United States of America	- Five countries did not assign grades for the indicator *Government Strategies and Investments.* - Grades were within "B" and "C" ranges, regardless of the country's income level. - Many countries had high grades for policy environments in governments and schools and low grades for health behaviour indicators policies were targeting. - More developed policy environments were found in countries with higher economic standard.
World Health Organization, 2010 [230]	27 countries, including: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom	- A considerable increase in the number of policy documents related to PA promotion was noticed. - Most of the identified policies were national-level documents. - Policy documents within the public health sector were found in twenty-one countries. - Documents in the transport sector were found in 11 countries. - Three countries had documents in the environment sector. - Only one country had a document related to road infrastructure and safety. - The documents (*n* = 129) focused on the following key sectors or population groups: nutrition (*n* = 38); public health (*n* = 28); obesity (*n* = 14); PA and nutrition (*n* = 12); children (*n* = 11); NCDs (*n* = 9); education

		(*n* = 6); agriculture (*n* = 6); consumers (*n* = 2); healthy ageing (*n* = 2); and inequalities (*n* = 1). - Time frames in the documents varied from three to ten years.
World Health Organization, 2015 [235]	26 countries, including: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom	- Twenty-two countries have national "Sport for all" policies. - Twenty-seven countries have adopted policies in the sports sector, 22 in the health sector, and 19 in the education sector. - More than 50% of countries (*n* = 16) developed national coordination leadership and mechanisms related to HEPA promotion. - Twenty countries are members of international networks (mainly the WHO Healthy Cities Network). - One third of policies is focused on elderly and socially disadvantaged groups. - Women during and before pregnancy are the least represented target group in PA policies.

EU = European Union; HEPA = health-enhancing physical activity; NCD = noncommunicable disease; PA = physical activity; RC = report card; WHO = World Health Organization

Appendix B5: Additional file 5: Definitions of policy in general, public policy, physical activity policy, health policy, and policy document included in studies analysing indicators, development, and content of national-level physical activity and sedentary behaviour policies

Publication	Definitions
Active Healthy Kids Canada, 2012 [54]	"Public policies have consequences for communities and people. Examples of public policies include government budgets and taxation rules. Public policies provide direction to the central branch of most modern governments – the executive (e.g., Prime Minister's Office, cabinet and the bureaucracy at the federal governmental level in Canada) – and find expression in government laws and regulations [238]".
Active Healthy Kids Canada, 2014 [56] Active Healthy Kids Canada, 2013 [55]	"'Policy can be defined as a legislative action, organized guidance or rule that may affect people's physical activity environment or behaviour' [239]. Policies can be in the form of written codes or standards that guide choices or common practices. Both government and non-government organizations have a role to play in shaping policies that aim to increase physical activity and decrease sedentary behavior in Canadian children and youth".
Al-Bahlani and Mabry, 2014 [62]	"The following definitions, based on Merriam Webster dictionary, were used to classify the documents: …policy—a method of action . . . to guide and determine present and future decisions…"
Bellew et al., 2008 [6]	"Physical activity policy has been defined as: 'a formal statement that defines physical activity as a priority area, states specific population targets and provides a specific plan or framework for action. Further, it is held that a policy should 'describe the procedures of institutions in the government, non government and private sector to promote physical activity in the population, and defines the accountabilities of the involved partners' [26]".
Bellew et al., 2011 [8]	"'Health policy' is a formal statement or procedure within institutions (notably government) that defines priorities and the parameters for action in response to health needs, available resources, and other political pressures [240]. The main aim of physical activity–related public policy is to create supportive environments, infrastructure, and pro- grams to enable people to lead active lives. It makes the social and physical environments health-enhancing [240]. Our use of the term 'public policy' in this article combines these two definitions proposed in the WHO health promotion glossary; we emphasize that the actions required to promote physical activity involve multiple agencies and sectors and not merely the health sector. Policy may be conceptualized at three levels reflecting social and political commitment [16]: (1) formal written codes, regulations, or decisions with legal authority (legislation and urban planning zoning are examples of this type of policy); (2) written standards that guide choices (guidelines suggesting physical education standards for all school-age children are an example of standards that guide but do not mandate policy); and (3) unwritten social norms that influence behavior (including the culture of sedentariness, reduced energy expenditure in everyday lives). 'Evidence-based public policy' is based on research that has undergone quality assurance and methodologic scrutiny".
Brown et al., 2011 [43]	"A policy is a formal statement that should define priorities for action, goals and strategies as well as accountability and allocation of resources [26]".
Bull et al., 2004 [26]	"Policy is a formal statement that defines priorities for action, goals and strategies, as well as accountabilities of involved actors and allocation of resources. Policy provides a guide to action to achieve intended goals, initiated by government, non-government or private sector organisations, and can occur on a written (eg, within legislation, policy documents) or on an unwritten basis (eg, within usual practice). Although sometimes confusing, policy can also refer to political or bureaucratic processes, as well

	as to particular decisions… …the following definition of a policy on PA was developed: a formal statement that defines physical activity as a priority area, states specific population targets and provides a specific plan or framework for action. Further, it is held that a policy should 'describe the procedures of institutions in the government, non government and private sector to promote physical activity in the population, and defines the accountabilities of the involved partners".
Bull et al., 2004 [86]	"Policy describes a procedure to gain desired outcomes, initiated by government, non-government or private sector organisations. It is a formal statement that defines priorities for action, goals and strategies, as well as accountabilities of involved actors and allocation of resources. They provide a guide to action to achieve the intended goals. Policy can occur on a written (e.g. within legislation, policy documents) or on an unwritten basis (e.g. within usual practice), and it can refer to particular decisions as well as to political and bureaucratic processes… Physical activity policy is a formal statement that defines physical activity as a priority area, states specific targets and provides a specific plan or framework for action. It describes the procedures of institutions in the government, non-government and private sectors to promote physical activity in the population. In addition it should define the accountability of the involved partners".
Chimeddamba et al., 2015 [92]	"Health policy is defined as the decisions, plans, and actions undertaken to achieve specific health care goals within a society [241]".
Christiansen et al., 2014 [44]	"A policy is defined as a written document, which has been endorsed, including statements and decisions defining goals, priorities and main directions for attaining these goals".
Craig, 2011 [95]	"…policy is defined as written documents or statements that identify PA as a priority area for the population or target populations and outlines a framework for action".
Daugbjerg et al., 2009 [11]	"…policy documents are written documents that contain strategies and priorities, define goals and objectives, and are issued by a part of the public administration".
Eyler, 2011 [103]	"Physical activity policy is a legislative action, organized guidance, or rule that may affect the physical activity environment or lifestyle behavior. These policies can be in the form of formal written codes, written standards that guide choices, or common practices [16]."
Guo and Pan, 2016 [113] (in Chinese language)	"PA policy is a formal written document that provides guidelines for PA promotion". –translation from Chinese.
Kalman et al., 2008 [129]	"Policy is understood as the process and method of binding decision making of a certain group of people with pluralistic interests and opinions. In terms of these collective decisions, policy constitutes the art of administering public affairs, the art of governing a country and protecting the interests of one country against another one, creating and maintaining relationships".
Lachat et al., 2013 [140]	"…a broad definition of policy was used, and all national documents that included the national objectives and guidelines for action in the domain of diet and/or physical activity and/or prevention of NCDs were included".
Mendez, 2015 [153] (in Spanish language)	"The definition of public policy can be constructed from two basic aspects: a) policies as the set of interrelated decisions about the selection of goals and the means to achieve them, starting from the exercise of public authority [243] and b) the public, which for Nora Rabotnikof [242], is observed in three senses: the public as interest or common utility, as opposed to private; the public as the manifest and ostensible, a contrary to the secret and preserved; and the public as accessible for all, a contrary to the closed". - translation from Spanish.
Milton and Bauman, 2015 [40]	"…four key aspects of physical activity policy: 1) national recommendations on physical activity levels; 2) national goals and targets; 3) surveillance or health monitoring systems; and 4) public education".
Pate et al., 2011 [37]	"We defined physical activity policy as 'a formal written document that provides guidelines to promote physical activity in the public'".

Piggin, 2008 [168]	"A working definition here however is borrowed from Jenkins (1978) who describes public policy as 'a set of interrelated decisions taken by a political actor concerning the selection of goals and the means of achieving them within a specified situation where these decisions should, in principle, be within the power of these actors to achieve' [244]."
Pratt et al., 2016 [171]	"'Policy provides an organizing structure and guidance for collective and individual behavior. It may be defined as legislative or regulatory action taken by federal, state, city, or local governments, government agencies, or nongovernmental organizations such as schools or corporations. Policy includes formal and informal rules and design standards that may be explicit or implicit'[16]".
Rütten et al., 2013 [185]	"Physical activity promotion policies are complex and multidisciplinary policy approaches that depend on multiple actors at various levels of policy-making…" Definition outlined in connected study: "The WHO defines health policy as a "formal statement or procedure within institutions (notably government) which defines priorities and the parameters for action in response to health needs, available resources and other political pressures" [240]. Our approach, by contrast, is based on a broader definition of policy, which also includes informal institutional arrangements and procedures as well as rationales for action on health- related issues". [245]
Schöppe et al., 2004 [187]	"Policy describes a procedure or a guide to action to achieve intended goals, initiated by governmental, non governmental or private sector organisations. It determines the means by which the environment is to be altered to gain desired outcomes. At best, because this makes policy more obvious to the public, it is based on a formal statement that defines priorities for action, goals and strategies, as well as accountabilities of involved actors and allocation of resources. Policy can occur on a written (e.g. within legislation, policy documents) or on an unwritten basis (e.g. within usual practice), and it can refer to particular decisions as well as to political and bureaucratic processes. A main characteristic of policy is the procedure aspect, in the literature described as policy process or policy cycle involving the phases initiation, adoption, implementation, evaluation, reformulation... Policy is often not a single decision, but a web of decisions or sometimes rather a non-decision… 'Physical activity policy is a formal statement that defines physical activity as a priority area, states specific population targets and provides a specific plan or framework for action. It describes the procedures of institutions in the government, non government and private sector to promote physical activity in the population, and defines the accountabilities of the involved partners.'"
Seppälä et al., 2017 [39]	"Health policy is defined by the World Health Organization as 'decisions, plans, and actions that are undertaken to achieve specific health care goals within a society' [241]. Policies are a means for generating and/or supporting the implementation of health behaviour change interventions, which are a set of activities designed to bring about change; thus policies are crucial for the interventions' implementation and outcomes".
Woods and Mutrie, 2012 [218]	"A physical activity policy is an example of a public health policy. It is a document that defines physical activity as a priority area; that identifies specific population goals and targets, and that provides a framework for action, or an action plan to achieve these goals [6]. Ideally, a physical activity policy should also define of roles and responsibilities of involved partners, allocation of resources, and clearly identify accountability for implementation of specific components of the policy aligned to a realistic and achievable timeframe [26]".
World Health Organization, 2010 [12]	"…policy documents were defined as written documents that contain strategies and priorities, define goals and objectives, and were issued by part of the public administration".
World Health Organization, 2010 [228]	"The definition of 'policy' as used in the glossary of terms, i.e. a 'written document that contains strategies and priorities, define goals and objectives and is issued by a part of the administration', was highlighted…".

World Health Organization, 2010 [229]	“The following definition of ‘policy’ was used in identifying national policies: ‘a written document that contains strategies and priorities, defines goals and objectives, and is issued by a part of the administration’”.
World Health Organization, 2011 [231]	“A policy was defined as a written document, which has been endorsed, including statements and decisions defining goals, priorities and main directions for attaining these goals. It may also include an action plan on implementation”.

PA = physical activity

Full text of the articles available in English, if not noted otherwise.

Appendix C: Additional files complementing a Delphi process in the development of the *CAPPA* framework (Chapter 5)

Appendix C1: Example of a Delphi survey (from the first round of Delphi process)

Page 1 / Instruction to participants and consent to participate in the survey

This short 15-minute survey is conducted as a part of the first round of the Delphi decisional process on a theoretical framework for physical activity policy analysis. You have been invited to participate as a panel member in the decisional process. Your participation in the survey is voluntary and your responses will be anonymous to the survey moderator and to other panel members. You are not required to respond to all questions, and you may quit with the survey at any time. However, to facilitate the decisional process, we would prefer if you would respond to all survey questions.

1. Do you consent to participate in this survey?
- O Yes
- O No

If 'Yes' is selected, the second page appears. If 'No' is selected the page twelve appears.

Page 2 / Referral to the supplementary information sheet and a confirmation the participant read the document

Please read the Supplementary Information Sheet before responding to survey questions and, if needed, refer to the information presented in the document while responding to the questions.

2. Have you read the Supplementary Information Sheet?
- O Yes
- O No

If 'Yes' is selected, the third page appears. If 'No' is selected the twelfth page appears.

Page 3 / Question 1
3. The proposed name of the framework is Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework. Do you agree with the proposed name?
- O Yes
- O No

Page 3 / Question 2
4. If not, which name would you propose?

Page 4 / Question 1
5. Do you agree with the inclusion, proposed names, and proposed definitions of the following six categories of the framework?

Category	Yes	No
Purpose of analysis	○	○
Policy level	○	○
Policy sector	○	○
Type of policy	○	○
Stage of policy cycle	○	○
Scope of analysis	○	○

Page 4 / Question 2
6. If you disagree with the inclusion, name, and/or definition of any of the proposed categories, what would you suggest to change and why?

Purpose of analysis	
Policy level	
Policy sector	
Type of policy	
Stage of policy cycle	
Scope of analysis	

Page 4 / Question 3
7. Do you think any other categories should be added to the framework?
○ Yes
○ No

Page 4 / Question 4
8. If you do, please propose the names, definitions, and elements of the additional categories and briefly explain why you think they should be added:

Page 5 / Question 1
9. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Purpose of analysis" category?

Elements	Yes	No
Auditing	○	○
Assessment	○	○

Page 5 / Question 2
10. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

Auditing	
Assessment	

Page 5 / Question 3
11. Do you think any other elements should be added to this category of the framework?
- ○ Yes
- ○ No

Page 5 / Question 4
12. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 6 / Question 1
13. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Policy level" category?

Elements	**Yes**	**No**
International	○	○
National	○	○
State	○	○
Regional	○	○
Local	○	○
Institutional	○	○
International	○	○

Page 6 / Question 2
14. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

International	
National	
State	
Regional	
Local	
Institutional	
International	

Page 6 / Question 3
15. Do you think any other elements should be added to this category of the framework?
- ○ Yes
- ○ No

Page 6 / Question 4
16. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 7 / Question 1
17. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Policy sector" category?

Elements	**Yes**	**No**
Business	O	O
Education	O	O
Environment	O	O
Health	O	O
Sport and recreation	O	O
Tourism	O	O
Transport	O	O
Urban planning and design	O	O

Page 7 / Question 2
18. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

Business	
Education	
Environment	
Health	
Sport and recreation	
Tourism	
Transport	
Urban planning and design	

Page 7 / Question 3
19. Do you think any other elements should be added to this category of the framework?
O Yes
O No

Page 7 / Question 4
20. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 8 / Question 1
21. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Type of policy" category?

Elements	Yes	No
Formal written policies	○	○
Formal unwritten policies	○	○
Written standards	○	○
Formal procedures	○	○
Informal policies	○	○

Page 8 / Question 2
22. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

Formal written policies	
Formal unwritten policies	
Written standards	
Formal procedures	
Informal policies	

Page 8 / Question 3
23. Do you think any other elements should be added to this category of the framework?
○ Yes
○ No

Page 8 / Question 4
24. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 9 / Question 1
25. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Stage of policy cycle" category?

Elements	Yes	No
Agenda setting	○	○
Formulation	○	○
Legitimation	○	○

Implementation	O	O
Evaluation	O	O
Maintenance	O	O
Succession	O	O
Termination	O	O

Page 9 / Question 2
26. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

Agenda setting	
Formulation	
Legitimation	
Implementation	
Evaluation	
Maintenance	
Succession	
Termination	

Page 9 / Question 3
27. Do you think any other elements should be added to this category of the framework?
O Yes
O No

Page 9 / Question 4
28. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 10 / Question 1
29. Do you agree with the inclusion, proposed names, and proposed definitions of the following elements of the framework in the "Scope of analysis" category?

Elements	**Yes**	**No**
Availability	O	O
Content	O	O

Page 10 / Question 2
30. If you disagree with the inclusion, name, and/or definition of any of the proposed elements, what would you suggest to change and why?

Availability	
Content	

Page 10 / Question 3
31. Do you think any other elements should be added to this category of the framework?
- O Yes
- O No

Page 10 / Question 4
32. If you do, please propose the names and definitions of the additional elements and briefly explain why you think they should be added:

Page 11 / Question 1
33. Do you have any other suggestions regarding the framework?
- O Yes
- O No

Page 11 / Question 2
34. If you do, please list your additional suggestions regarding the framework:

Page 12
Thank you for your responses!

Appendix D: Additional files complementing *A systematic review of instruments for the analysis of national-level physical activity and sedentary behaviour policies* (Chapter 6)

Appendix D1: Additional file 1: Full search syntaxes used for each database

Scopus:

title-abs-key("physical activity" or "physical inactivity" or sedentar* or sitting) and title-abs-key(policy or policies)

PubMed/MEDLINE:

("physical activity"[tw] OR "physical inactivity"[tw] OR sedentar*[tw] OR sitting[tw]) AND (policy[tw] OR policies[tw])

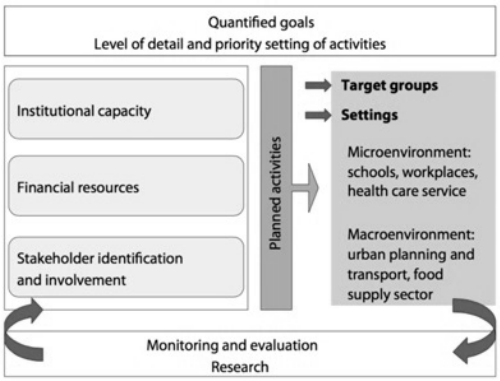
Web of Science, SportDiscus (through EBSCOhost) Open Access Theses and Dissertations (OATD), Networked Digital Library of Theses and Dissertations (NDLTD):

("physical activity" or "physical inactivity" or sedentar* or sitting) and (policy or policies)

Appendix D2: Additional file 2: Instruments for the analysis of physical activity and/or sedentary behaviour policies and their description

Instrument	Author(s) and publication	Short description of the publication(s) and the instrument	Detailed description and/or visual representation of the instrument
Policy principles for the promotion of healthy diets and physical activity	(World Health Organization, 2003)	This publication is an extensive technical report of the WHO and the United Nation's Food and Agriculture Organization expert consultation that took place in 2002 in Geneva, Switzerland. The consultation was about diet, nutrition, and the prevention of chronic diseases. The report mentions policy principles for the promotion of healthy diets and PA.	"Policy principles for the promotion of healthy diets and physical activity: 1) Strategies should be *comprehensive* and address all major dietary and physical activity risks for chronic diseases together, alongside other risks - such as tobacco use - from a multisectoral perspective. 2) Each country should select what will constitute the *optimal mix of actions* that are in accord with national capabilities, laws and economic realities. 3) *Governments have a central steering role* in developing strategies, ensuring that actions are implemented and monitoring their impact over the long term. 4) *Ministries of health have a crucial convening role* - bringing together other ministries needed for effective policy design and implementation. 5) *Governments need to work together with* the private sector, health professional bodies, consumer groups, academics, the research community and other nongovernmental bodies if sustained progress is to occur. 6) *A life-course perspective* on chronic disease prevention and control is critical. This starts with maternal and child health, nutrition and care practices, and carries through to school and workplace environments, access to preventive health and primary care, as well as community based care for the elderly and disabled people. 7) Strategies should explicitly address equality and diminish disparities; they should focus on the needs of the *poorest communities and population groups* - this requires a strong role for government. Furthermore, since women generally make decisions about household nutrition, strategies should be *gender* sensitive. 8) Strategies need to draw substantially on existing *international standards* that provide a reference in international trade… WHO's international leadership role in pushing forward the agenda on diet,

			physical activity and health is crucial." p. 135-136
Criteria for successful policy and action plans on physical activity	(Bull et al., 2004a; Bull et al., 2004b; Schöppe et al., 2004)	This study contains a journal article and two reports. It is an analysis of the development and the content of PA policy several countries around the world. The data on policies were extracted from articles, national policy documents, and grey literature obtained through an electronic literature search. PA policies of several countries around the world were assessed against 11 specific criteria for successful PA policy and action plans.	"Criteria for successful policy and action plans on physical activity: 1) *Consultation with* key stakeholders during development of policy and action plans; 2) Adoption of a comprehensive approach using *multiple strategies* (eg, individual-oriented as well as environmental focused interventions) targeting different population groups; 3) Working at *different levels* (local, state and national as well as individual whole community and physical environmental level); 4) Development of policy and action plan across multiple agencies by *working through coalitions, alliances and partnerships* (eg, involving cross government, non-government as well as relevant private sector partners); 5) *Integration* of PA policy within other related agendas (eg, in the field of health, nutrition, transport, environment); 6) *Stable base of support and sustainable resources* to implement the policy and action plan; 7) Development of an *Identity* for the policy and action plan by means of a logo, branding and/or slogan and/or key spokesperson or 'champion' for the initiatives as well as an advocacy / communication plan; 8) A clear statement of the *Timeframe* of the policy commitment and implementation of the action plan; 9) Specific plans and resources for *Evaluation* of the policy and action plan implementation (undertaking evidence based approaches supported by appropriate budget); 10) Development and/or maintenance of appropriate *Surveillance or Health Monitoring Systems* including measures of levels of physical (in)activity; 11) Statement of recognition of existing *National guidelines/recommendations on PA* or intent to develop them." (Bull et al., 2004a) p. 96

A Comprehensive Physical Activity Policy Framework	(Shephard et al., 2004)	This is a practice article on WHO/CDC consultation on PA policy development that took place in Atlanta, Georgia in 2002. The article outlines the context and outcomes of the consultation. It describes a comprehensive, six- stage PA policy framework.	 A Comprehensive Physical Activity Policy Framework p. 348
Elements of national policy documents	(Branca et al., 2007)	This publication issued by the WHO Regional Office for Europe is about the obesity challenge in the WHO European Region. One of its chapters is related to *National policies in the European Region*. National policy documents on PA, obesity, and nutrition were analysed using an analytical framework based on elements used in previous policy analyses and policy analysis tools.	 Elements of national policy documents p. 260
Key principles that should guide member states in the development of national physical activity strategies	(World Health Organization, 2007d)	This publication issued by the WHO Regional Office for Europe provides a guidance for the WHO member states, policy-makers, and experts on designing and implementing	1) Population health: The population health approach (PHA) focuses on improving the overall health status of the population and subpopulations, rather than on the individual. While the ultimate goal is to improve the health of individuals, the PHA emphasizes improving the broad conditions and environments that affect health and healthy choices. This includes addressing some of the root causes that lead to poor health outcomes, reducing inequities in health status between

		PA-promoting policy and action. It provides seven key principles for successful PA strategies applicable at national and subnational levels.	subpopulations, increasing awareness of healthy choices, and creating services and environments that promote and maintain health. 2) Comprehensive: Strategies should include components such as public awareness, multiple physical activity interventions and patterns, leadership development, active infrastructure development and renewal, policies development, and partnership building. Strategies should consider initiatives in settings including the home/family, community, school, workplace and health care system. Strategies should focus on target groups, with an emphasis on the inactive, while not forgetting the general population and those already active. 3) Integrated: Many strategies are undertaken in isolation and do not benefit from the value and efficiencies of integrated approaches. Integration should be both vertical and horizontal. Vertical integration includes a seamless flow of information and involvement at the national, regional and local levels. Horizontal integration between areas such as health, education, transport, urban planning, recreation, social services and sport is just as vital. National and regional strategies need to support efforts at the local level where the greatest capacity for impact exists. 4) Complementary and collaborative: Physical activity is a leading lifestyle health determinant, and is a vital component in addressing obesity. Physical activity strategies should be linked to those focused on healthy eating and other health and chronic disease risk factors; communication campaign messages should be complementary where appropriate. Strategies at all levels require collaborative approaches by governmental, voluntary and corporate sectors. Those responsible for planning and implementing strategies should represent various sectors and areas, and seek out opportunities to act collaboratively. 5) Sustainable: Political and organizational commitment to long-term physical activity strategies is required at all levels. Local strategies should be supported by national strategies, but should not be financially dependent on them. The most effective national supports include leadership development, resources and tools, research and evaluation, proportional contributions toward active infrastructure

			development, public policies that enable local action and collaboration, and communication campaigns that can be complemented by local efforts. Sustainability is rooted in local commitments to ongoing actions and investment in planning, programmes, facilities, open spaces and active transportation systems. 6) Evidence-based and effective: National strategies need to identify clear outcomes that are based on measurable change. Their outcomes may include increasing the physical activity levels of the population and reducing obesity levels. Realistic targets should be set for these outcomes over specific time frames. Mechanisms need to be in place to monitor ongoing progress and to provide timely and meaningful data on the results. The national strategy should integrate research and evaluation into its program and policy development, and help communities to carry out meaningful measurement and evaluation on their own. The results of evidence-based interventions and other related research should be synthesized and disseminated on an ongoing basis. 7) Communicated: National physical activity strategies should consider the development of high-profile communication campaigns that increase overall awareness of the benefits of physical activity and encourage behaviour change. The messages should be consistent and clear, with many targeted at key population segments. National communication strategies should support local campaigns and be flexible enough to be used on multiple channels. They should also create networks to allow communities to share plans and success stories. The Member States also need to develop mechanisms for ongoing communication and information sharing regarding their strategies. p. 17-18 The publication also states recommendations for focused national commitment that should ensure that capacity is built up in terms of: “human resources with adequate skills and competencies; an organizational structure reflecting the importance of this health determinant; appropriate regulations, including legislation; national guidelines; a national action plan for physical activity; national programmes and campaigns; an intersectoral approach achieved through

			cooperation between different ministries; economic resources." p. 20
Important elements of successful physical activity policies and plans	(World Health Organization, 2007c)	This publication issued by the WHO is a guide that aims to provide guidance for an effective PA promotion and assist in the implementation and development of national PA plans. The guide was initially developed by the participants of the WHO workshop in 2005 in China. It contains 18 important elements of successful policies and plans for the WHO member states to into account when developing and/or implementing their PA policies.	"Important elements of successful policies and plans: 1) High-level political commitment; 2) Integration in national policies; 3) Identification of national goals and objectives; 4) Overall health goals; 5) Objectives; 6) Funding; 7) Support from stakeholders; 8) Cultural sensitivity; 9) Integration of physical activity within other related sectors; 10) A coordinating team; 11) Multiple intervention strategies; 12) Target whole population as well as specific population groups; 13) Clear identity; 14) Implementation at different levels within "local reality"; 15) Leadership and workforce development; 16) Dissemination; 17) Monitoring and evaluation; 18) National physical activity guidelines." p. 3-8
HARDWIRED criteria for successful national physical activity policy	(Bellew et al., 2008)	This journal article provides a comparison of Australian PA policy with international PA policies in seven countries assessed using nine criteria for successful national physical activity policy, the so called HARDWIRED criteria. Literature and policy reviews were combined with questionnaires sent to purposively	"Criteria for successful national physical activity policy (HARDWIRED): 1) Highly consultative in development; 2) Active through multi-strategic, multi-level, partnerships; 3) Resourced adequately; 4) Developed in stand-alone and synergistic policy modes; 5) Widely communicated; 6) Independently evaluated; 7) Role-clarified and performance-delineated; 8) Evidence-informed and Evidence-generating; and 9) Defined national guidelines for health enhancing physical activity." p. 2

		sampled experts.	
Eight aspects identified as being relevant for effective physical activity policies	(Daugbjerg et al., 2009)	This journal article is a content analysis of 27 policy documents from 14 countries in the European region. The documents were analysed based on eight aspects being relevant for effective PA policies.	Aspects "identified as being relevant for effective physical activity policies: 1) Sectors and institutions involved: involvement of different sectors in the preparation and implementation of the policy. Important partners include various sectors of the national government, subnational authorities, municipalities, nongovernmental organizations, the private sector, the media, associations, educational institutions, employers, etc.; 2) Implementation: implementation plan for the policy and a clear definition of the body or bodies responsible for the implementation; 3) Legal status: legally binding or nonbinding; formally adopted by government or not; 4) Target groups: clearly identified population groups targeted by the policy; 5) Goals and targets: physical activity goals or targets were specified for certain population groups and time periods; 6) Timeframe: clear timeframe specified for the implementation of the policy; 7) Budget: specified budget allocated to the implement of the policy; 8) Evaluation and surveillance: development or continuation of an evaluation on the implementation and results of the policy; surveillance or monitoring system to measure physical activity." p. 807
A graphical, computer-based decision-support tool to help decision makers evaluate policy options relating to physical activity	(Yancey et al., 2010)	This study described the development of a computer-based Decision-Support Tool. It was developed as a response to a request from the California Department of Health Services to provide assistance on assessment of policies for PA promotion. The tool is designed to support policy makers to systematically weigh, compare, and synthesise evidence	Decision Support tools for public health policies and interventions and its criteria: "Feasibility: 1) Low start-up costs 2) Quickly implementable 3) Political will/community receptivity 4) Reliability, consistency 5) Likelihood of sustainability 6) Availability of critical adjuncts to realize effects 7) User-specified Feasibility criteria Evidence: 8) Quality and quantity of scientific evidence Population impact: 9) Short-term efficacy 10) Effectiveness in general population 11) Effectiveness in target population (specificity) 12) Effectiveness in saving aggregate Quality-Adjusted Life-Years (QALYs) 13) Secondary health benefits (e.g. improved nutrition from increased physical activity)

		specific to public-health relevant policies and interventions.	14) Potential Dose Effects 15) Cost-effectiveness 16) Potential cumulative effects as part of a larger, coordinated strategy 17) User-specified Impact criteria Disparities reduction: 18) Magnitude of aggregate health effects (benefits) in high-risk or target populations 19) Reductions in existing disparities due to differential utilization or uptake 20) Proximal and distal distributional effects on different population segments 21) User-specified disparities reduction criteria" p. 275
Analysis of Determinants of Policy Impact (ADEPT) Model	(Rütten et al., 2010; Rütten et al., 2012)	In Rütten et al., 2010 The Analysis of Determinants of Policy Impact (ADEPT) approach is presented. The ADEPT model aims to explain and influence policy impact implementation and policy development using four determinants: obligations, goals, resources, and opportunities. It is a theory-based tool for influencing and understanding policy processes in health promotion. An empirical testing of the ADEPT model was conducted using a quantitative survey of policy makers from six European countries and from four health promotion policy fields. Rütten et al., 2012 study tested a theoretical model to	"List of items of items operationalizing ADEPT: Policy determinants Goals The goals are officially spelled out The goals are concrete enough The action centers on improving the health of the population Obligations Personally I feel obliged to do something in this field The action is part of my professional duties Scientific results demand the action We are obliged to the population to act in this area Resources There is enough personnel My organization has the necessary capacities There are sufficient financial resources Organizational opportunities My own involvement has worsened/improved The co-operation within my organization has worsened/improved Political opportunities The political climate has worsened/improved The support from other sectors has worsened/ improved The co-operation between political levels involved has worsened/improved The co-operation between public and private organizations has worsened/improved The lobby for the action has worsened/improved Public opportunities The involvement of the population has worsened/ improved The population supports the action

		develop and assess policies for PA promotion among older adults. For this study, a short 14-item List for Policy Assessment in Health Promotion version of the original questionnaire, was used for PA policy assessment. The questionnaire assessed policy-maker's perceptions of the organisational resources, goals, opportunities and obligations in the area of PA promotion.	The media's interest has worsened/improved Policy impact Outcome The action has achieved the intended behavior change in the population Considering cost-benefits, the action was worthwhile Personally I am satisfied with the results Output Various programs were implemented" (Rütten et al., 2010) p. 325
Categories for the content analysis of policies	(World Health Organization, 2011; Christiansen et al., 2014)	The study contains one journal article and one WHO publication. It used policy content analysis of EU member states' national (and subnational if no national available) policy documents related to HEPA and sport. The content analysis grid was developed based on Daugbjerg et al. (2009) and Bellew et al (2008). The grid was complemented with indicators relating specifically to sport.	"The following categories used for the content analysis of the policies: 1) General information – information about country of origin, language, issuing body and publication year 2) Timeframe – was a clear timeframe specified for the implementation of the document; 3) Stakeholder involvement in the development phase – the process of involving different stakeholders in the development of the strategies; 4) Reference to other national/international documents or physical activity guidelines – whether reference was made to other national or international documents; 5) Sport participation and health-enhancing physical activity – whether goals and targets were set for increasing sport participation and/or health-enhancing physical activity levels; 6) Elite sport and sport for all – whether elite sport and/or sport for all were addressed in the strategy; 7) Infrastructure – whether sport infrastructure was addressed in the strategy;

			8) Target groups – which population groups were targeted by the strategy; 9) Settings – which settings are addressed (e.g. schools, workplaces); 10) Implementation – the body responsible for implementation, whether other roles and responsibilities were outlined, and whether local-level implementation was addressed 11) Budget – whether a specified budget was allocated to implement the policy; and 12) Evaluation – whether the strategy had an evaluation plan and whether the main responsibility for evaluation was clarified." (Christiansen et al., 2014) p. 53-54
Health-Enhancing Physical Activity (HEPA) Policy Audit Tool (PAT)	(Bull et al., 2014a; Bull et al., 2014b; Bull et al., 2014c; Bull et al., 2014d; Bull et al., 2015)	The study contains two journal articles and two technical reports. It compared the development processes, content, and implementation of HEPA policies in seven EU countries (Finland, Italy, the Netherlands, Norway, Portugal, Slovenia, Switzerland). The data was collected using a 27-item instrument for PA policy audit - Health Enhancing Physical Activity Policy Audit Tool (HEPA PAT). For each country, a leading academic, a representative of relevant institute or (sub)national government official, was in charge for completion of the HEPA PAT. Directed content analysis was	Eleven sections of the HEPA PAT: "1) Background information and country context, including government structure (e.g. Please provide a brief overview of the government structure in your country) 2) Leadership and partnerships for HEPA promotion (e.g. Please state any agency(ies) providing leadership for HEPA promotion at the national level in your country.) 3) Key policy documents and their development process, including country history of physical activity policy (e.g. Please describe any key past policy documents and past events that have led to the current context of HEPA promotion in your country) 4) Scope and content of relevant policies and examples of implementation (e.g. Considering all the key physical activity policy documents listed in Question 7, please indicate which settings are included for the delivery of specific HEPA actions.) 5) Recommendations, goals and targets (e.g. Does your country have any national recommendations on physical activity and health?) 6) Surveillance (e.g. Does your country have a health surveillance or monitoring system that includes measures of physical activity or sedentary behaviour?) 7) Evaluation of relevant policies (e.g. Has your country undertaken evaluation of any of the national policies or action plans listed in Question 7?) 8) Funding and political commitment (e.g. Within each of the sectors listed, is funding specifically allocated or "ring-fenced" for the delivery of physical activity- related policy or action plans at the national level?)

		used to analyse collected data. A full description of the development of the HEPA PAT was described in one of the journal articles. The HEPA PAT is structured around 17 criteria identified as successful elements for policy approaches to PA.	9) Capacity building through a national network (e.g. Does any professional network or system exist in your country that links and/or supports professionals interested or currently working in physical activity or related areas?) 10) Experience of policy implementation, progress and remaining challenges (e.g. What do you think are the areas of greatest progress in national HEPA promotion in your country in recent years?) 11) Summary of the process undertaken to complete an assessment using the HEPA PAT" (Bull et al., 2015) p. 2
Government Strategies and Investments indicator for Active Healthy Kids Report cards	(Tremblay et al., 2014)	This journal article contains consolidated findings of Report Cards (RC) on PA in children and youth. The RCs include an assessment of wide range of PA indicators for children and youth. Each indicator was assessed according to its respective benchmarks by the group of experts in charge of their country's RC.	Benchmarks used to guide the *Government Strategies and Investments* indicator: "1) Evidence of leadership and commitment in providing physical activity opportunities for all children and youth. 2) Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth. 3) Demonstrated progress through the key stages of public policy making, that is policy agenda, policy formation, policy implementation, policy evaluation, and decisions about the future." p. S116 Indicators and benchmark tools are available at: https://www.activehealthykids.org/tools/
Questionnaire on the monitoring framework for the implementatio of policies to promote health-enhancing physical activity in the EU and WHO European Region 2015	(World Health Organization, 2015; European Physical Activity Focal Points Network, 2015)	This publication issued by the WHO Regional Office for Europe contains country factsheets related to HEPA promotion in the EU. It is an overview of information related to monitoring, surveillance, and policy response. The WHO/EU	Indicators of the *Questionnaire on the moni the implementation of policies to promote health-enhancing physical activity European Region*: "Indicator 1: National recommendation on p health (e.g. *Does a national recommendation on p health exist in your country, i.e. an officially adopted statement intensity and frequency of physical activity behavior that the populatio* Indicator 4: National government coordination mechanism and leadership on HEPA promotion (e.g. *Has a specific coordinating mechanism (e.g. working group, advisory board, coordinating institution etc.) been*

		PA focal points provided and validated PA-related data for their countries. For each member state a "country profile" was created from the data collected using a questionnaire on 23 HEPA indicators.	*developed for HEPA promotion in your country?* Indicator 5: Funding allocated specifically to HEPA promotion *(e.g. What is the yearly funding (in national currency) allocated specifically to HEPA promotion?)* Indicator 6*: National Sport for All policy or action plan Indicator 9*: Target groups addressed by the national HEPA policy Indicator 22*: National HEPA policies that include a plan for evaluation *(e.g. Does your country have a national policy and/or a national action plan on Sport for All promotion?; Which target groups does/do the national HEPA promotion policy/policies address, especially regarding groups in particular need of physical activity?; What is the percentage of national HEPA policies that include a clear intention or plan for evaluation?*) Indicator 10: Monitoring and surveillance of physical activity *(e.g. Does your country have an established surveillance or health monitoring system that includes population-based measures of physical activity?)* Indicator 11: Counseling on physical activity (e.g. *Does a programme or scheme to promote counseling on physical activity by health professionals exist in your country?)* *Indicator 12: Training on physical activity in curriculum for health professionals* *(e.g. Is physical activity and health (health effects, determinants, effective interventions etc.) taught in a module of the curriculum of health professionals, incl. e.g. nurses, doctors, physiotherapists?)* Indicator 13: Physical education in primary and secondary schools *(e.g. What is the number of hours of physical education provided in primary schools?)* Indicator 14: Schemes for school-related physical activity promotion (e.g. *Does your country have a national scheme for active school breaks (i.e. breaks between school lessons)?)* Indicator 16: Schemes promoting active travel to school (e.g. *Does a national scheme exist to promote active travel to school (e.g. walking buses, cycling)?)* Indicator 17: Level of cycling and walking

			(e.g. Does your country use tax incentives to promote active transport (such as congestion charges, increased parking fees or motor vehicle taxes)?) Indicator 19: Schemes to promote active travel to work *(e.g. Does a national scheme exist to promote active travel to work (e.g. walking, cycling)?)* Indicator 20: Schemes to promote physical activity at the workplace (e.g. *Does a national scheme exist to promote physical activity at the work place?)* Indicator 21: Schemes for community interventions to promote physical activity in older adults *(e.g. Does a specific national scheme or programme for community interventions to promote physical activity in older adults exist in your country?)* Indicator 23: National awareness raising campaign on physical activity *(e.g. Does a clearly formulated national campaign for physical education and public awareness exist in your country?)* * Indicators six, nine, and 22 were combined together in the questionnaire". (European Physical Activity Focal Points Network, 2015) p. 4-36
Surveillance and Policy status indicators for GoPA Country Cards	(Ramirez Varela et al., 2016; Ramirez Varela et al., 2017)	This almanac and the associated journal article contain Report Cards (RC) on PA for 217 countries. Each RC contains six common indicators: general information; physical activity prevalence; physical inactivity health burden and related mortality; national physical activity plan; physical activity surveillance; and research in physical activity. Data were obtained through Internet search. Data for 139 countries were	<u>Surveillance and policy status:</u> Content of the fourth indicator *National plan*: "Availability of a national or sub-national PA plan, classified as: a) no clear physical activity policy b) physical activity embedded as part of a NCD plan c) standalone physical activity plan" Content of the fifth indicator surveillance: "Existence of a national survey that includes physical activity questions and the first, most recent and next survey, classified as: a) no national physical activity surveillance data b) one physical activity survey identified c) two surveys identified d) three or more surveys identified, and a clear periodicity, with a specific year for the next survey". (Ramirez Varela et al., 2016) (Ramirez Varela et al., 2016) p. 28

		reviewed and approved by country contacts. The RCs reported on the availability of national or sub-national PA plans, which was one of six PA indicators.	
GoPA Policy Inventory 1.0 2017	(Global Observatory for Physical Activity, 2017)	This questionnaire is still unpublished document developed by the GoPA. It is based on the second version of the HEPA PAT and the European Monitoring Framework. It contains ten items.	Sections of the questionnaire: 1) Main government ministries that have active role in HEPA promotion; 2) Important national organizations (outside government) actively engaged in HEPA promotion; 3) Documents that outline intention to increase national PA levels (policy documents, legislation, strategies or action plans); 4) Existence and target groups of national recommendations on PA and health; 5) Existence and target groups of national recommendations on SB reduction; 6) Existence of surveillance/monitoring system; 7) Existence of national goals and timeframe for increasing PA levels; 8) Settings included in delivering of HEPA actions; 9) Population groups targeted by HEPA actions; 10) Existence of professional network for supporting professionals working in PA area.”

Appendix D3: Additional file 3: Sample questions for PA policy assessment/auditing

Sample questions are derived from the following set of criteria:
World Health Organization, *Diet, nutrition and the prevention of chronic diseases, Report of a Joint WHO/FAO Expert Consultation*. 2003, World Health Organization: Geneva.

Sample questions 1 and 2 are derived from the following principle: "Strategies should be *comprehensive* and address all major dietary and physical activity risks for chronic diseases together, alongside other risks - such as tobacco use - from a multisectoral perspective". (World Health Organization, 2003)

1) On the scale from 1 to 5, please rate how comprehensive is the national PA strategy (or an equivalent policy document)!

   O 1 – not at all comprehensive
   O 2
   O 3
   O 4
   O 5 – very comprehensive
   O Don't know

2) Does the national PA strategy (or an equivalent policy document) address the problem of insufficient physical activity from a multisectoral perspective?

   O Yes
   O No
   O Don't know

Sample questions 3 and 4 are derived from the following principle: "Each country should select what will constitute the *optimal mix of actions* that are in accord with national capabilities, laws and economic realities". (World Health Organization, 2003)

3) When addressing the problem of insufficient PA, did your country select an optimal mix of actions?

   O Yes
   O No
   O Don't know

4) Were the selected actions in accordance with…

… national capabilities?	O Yes	O No	O Don't know
… national laws?	O Yes	O No	O Don't know
… national economic realities?	O Yes	O No	O Don't know

(World Health Organization, 2003)

5) Which body had a central steering role in the development of the national PA strategy (or an equivalent policy document)?

O _____

O Don't know

6) Is it ensured that the actions specified in the national PA strategy (or an equivalent policy document) are implemented?

O Yes
O No
O Don't know

7) Which body ensures that the actions specified in the national PA strategy (or an equivalent policy document) are implemented?

O _____

O Don't know

8) Is it ensured that the impact of the actions specified in the national PA strategy (or an equivalent policy document) is monitored over the long term?

O Yes
O No
O Don't know

9) Which body ensures that the impact of the actions specified in the national PA strategy (or an equivalent policy document) is monitored over the long term?

O _____

O Don't know

Sample question 10 is derived from the following principle: *"Ministries of health have a crucial convening role* - bringing together other ministries needed for effective policy design and implementation". (World Health Organization, 2003)

10) Does the Ministry of Health (or an equivalent ministry) have a crucial convening role, that is, it brings together other ministries needed for the effective…

… design of PA policies?	O Yes	O No	O Don't know

… implementation of PA policies?	O Yes	O No	O Don't know

Sample question 11 is derived from the following principle: *"Governments need to work together with* the private sector, health professional bodies, consumer groups, academics, the research community and other nongovernmental bodies if sustained progress is to occur". (World Health Organization, 2003)

11) When addressing the problem of insufficient PA, does the Government work together with…

… the private sector?	O Yes	O No	O Don't know
… health professional bodies?	O Yes	O No	O Don't know
… consumer groups?	O Yes	O No	O Don't know
… academics?	O Yes	O No	O Don't know
… research community?	O Yes	O No	O Don't know
… non-governmental bodies?	O Yes	O No	O Don't know

Sample question 12 is derived from the following principle: "*A life-course perspective* on chronic disease prevention and control is critical. This starts with maternal and child health, nutrition and care practices, and carries through to school and workplace environments, access to preventive health and primary care, as well as community based care for the elderly and disabled people". (World Health Organization, 2003)

12) Is a *life-course perspective* integrated in the national efforts to address the problem of insufficient physical activity? *(A life-course perspective commences with maternal health, child health, and care practices, continues through to the school environment and later to the workplace environment, and includes the access to preventive health care, primary health care, and community-based care for disabled people and seniors)*

O Yes
O No
O Don't know

Sample questions 13, 14 and 15 are derived from the following principles: "Strategies should explicitly address equality and diminish disparities; they should focus on the needs of the *poorest communities and population groups* - this requires a strong role for government. Furthermore, since women generally make decisions about household nutrition, strategies should be *gender* sensitive". (World Health Organization, 2003)

13) Does the national PA strategy (or an equivalent policy document) explicitly address equality and diminish disparities?

- O Yes
- O No
- O Don't know

14) Does the national PA strategy (or an equivalent policy document) focus on the needs of the poorest communities and population groups?

- O Yes
- O No
- O Don't know

15) Is the national PA strategy (or an equivalent policy document) *gender* sensitive?

- O Yes
- O No
- O Don't know

Sample question 16 is derived from the following principle: "Strategies need to draw substantially on existing *international standards* that provide a reference in international trade… WHO's international leadership role in pushing forward the agenda on diet, physical activity and health is crucial". (World Health Organization, 2003)

16) Does the national PA strategy (or an equivalent policy document) draw substantially on existing *international standards* that provide a reference in international trade?

- O Yes
- O No
- O Don't know

Appendix E: Additional files complementing *National physical activity and sedentary behaviour policies in 76 countries: availability, comprehensiveness, implementation, and effectiveness* (Chapter 7)

Appendix E1: Information for participants involved in the study

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

INFORMATION FOR PARTICIPANTS INVOLVED IN THE STUDY

You are invited to participate

You are invited to participate in a research project entitled *A Critical Assessment of National Physical Activity and Sedentary Behaviour Policies: An International Study*.

This project is being conducted by a student researcher Bojana Klepac Pogrmilovic as part of her PhD studies at Victoria University under the supervision of Associate Professor Zeljko Pedisic and in collaboration with Global Observatory for Physical Activity (GoPA!).

Project explanation

This project aims to collect information about and critically assess national physical activity and sedentary behaviour policies using the GoPA! Policy Inventory questionnaire. The questionnaire will be distributed to all GoPA! national contact points. The data obtained from the questionnaires will be critically assessed, presented separately for each country, and compared internationally.

What will I be asked to do?

You will be asked to fill in an online questionnaire related to your country. Completing the survey should not take you more than one hour.

What will I gain from participating?

You will benefit from participating in this study by making an active contribution to the promotion of more physical activity and less sedentary behaviour at the population level.

How will the information I give be used?

The information collected critically assessed and compared between countries. A manuscript containing the survey data is planned to be published in an academic journal.

What are the potential risks of participating in this study?

There are no potential risks of participating in this study.

How will this study be conducted?

An online survey will be sent to all GoPA! national contact points.

Who is conducting the study?

Victoria University, Institute for Health and Sport:
Associate Professor Zeljko Pedisic (chief investigator)
Phone: +61 3 9919 5275
E-mail: zeljko.pedisic@vu.edu.au

Bojana Klepac Pogrmilovic (PhD candidate)
Phone: +61 458 498 889
E-mail: bojana.klepacpogrmilovic@live.vu.edu.au

in collaboration with the Global Observatory for Physical Activity (http://www.globalphysicalactivityobservatory.com/).

Any queries about your participation in this project may be directed to the Chief Investigator.
If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix E2: Consent form for participants involved in research

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to take part in the study entitled

"A Critical Assessment of National Physical Activity and Sedentary Behaviour Policies: An International Study"

You have been chosen to participate in this research because of your expertise in public health and/or physical activity policy. We would like you to fill in the GoPA! Policy Inventory questionnaire that aims to assess the governmental physical activity and sedentary behaviour policies in your country. The questionnaire has been distributed to all GoPA! national contact points. The data obtained from the questionnaires will be critically assessed, presented separately for each country, and compared internationally.

CERTIFICATION BY PARTICIPANT

I, _____
(name, surname and country)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study:
Assessment of national physical activity and sedentary behaviour policies being conducted at Victoria University by:
Associate Professor Zeljko Pedisic

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by:

Bojana Klepac Pogrmilovic, bojana.klepacpogrmilovic@live.vu.edu.au

and that I freely consent to participation involving the below mentioned procedures:

- Fill in the GoPA! Policy Inventory questionnaire related to my country

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

By clicking on the "OK" button you will provide your informed consent to participate in this study.

Any queries about your participation in this project may be directed to the researcher:

Zeljko Pedisic, PhD, Associate Professor and Leader of the Active Living & Public Health Group at Institute for Health and Sport, Victoria University
Contact details: Building P, Footscray Park Campus, Ballarat Road, Footscray VIC 3001, +61 3 9919 5275, zeljko.pedisic@vu.edu.au

If you have any queries or complaints about the way you have been treated as part of this study, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email Researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix E3: Additional file 1: The Global Observatory for Physical Activity – *GoPA! Policy Inventory*

The Global Observatory for Physical Activity-GoPA! Policy Inventory

Version 3.0, August 2019; Based on the Health-Enhancing Physical Activity Policy Audit Tool (HEPA-PAT, version 2.0), the monitoring framework from the EU Recommendation on Health-Enhancing Physical Activity Across Sectors, and the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework.

This survey is conducted as a part of the second cycle of GoPA! Country Cards project. You have been invited to participate as a GoPA! Country Contact. Your participation in the survey is voluntary. You are not required to respond to all questions, and you may quit the survey at any time. However, it would be really important if you could respond to all survey questions. The survey will take about one hour to complete, depending on your responses.

Before you proceed, please read the information for participants.

Do you consent to participate in this survey?

Yes	No
☐	☐

A	**Your name and surname:**	
B	**Country for which you are providing responses:**	
C	**Are you...**	
	... the main GoPA! Country Contact for this country?	☐
	... a part of the GoPA! Country Card team for this country but not the main Country Contact?	☐
	… neither of the above (please write your position)	

1	**Does your country have a physical activity plan/policy?**		
	Yes	No	Don't know
	☐	☐	☐

2	**If yes, is it…**		
	… embedded in an NCD prevention plan?	… standalone for physical activity?	Don't know
	☐	☐	☐

3	**If your country has a physical activity plan/policy, please provide information about it.**		
	Policy "A" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐

	Web link (please also send a copy of the document by email to Andrea Ramirez Varela - Global Observatory for Physical Activity – GoPA! – Coordinator email; aravamd@gmail.com):	Don't know ☐	N/A ☐

4	**Does your country have other current <u>national policy documents, legislation, strategies, or action plans</u> that outline the government's intention to…**			
		Yes	No	Don't know
	… increase population physical activity?	☐	☐	☐
	… tackle population sedentary behaviour?	☐	☐	☐

5	**If yes, please provide information about up to five <u>most relevant ones</u>.**		
	Policy "B" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐
	Web link:	Don't know ☐	N/A ☐
	Policy "C" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐
	Web link:	Don't know ☐	N/A ☐
	Policy "D" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐
	Web link:	Don't know ☐	N/A ☐
	Policy "E" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐
	Web link:	Don't know ☐	N/A ☐
	Policy "F" title:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Time frame covered:	Don't know ☐	N/A ☐
	Issuing body:	Don't know ☐	N/A ☐
	Web link:	Don't know ☐	N/A ☐

6	Policy implementation includes translating statements, ideas, goals, and/or objectives mentioned in the policy documents into practice. For example, a policy document may mention building new facilities as one of the strategies to increase participation in physical activity. Implementation of this statement means having the new facilities actually built.

Please estimate to what extent have the above-mentioned policies (described in questions 1 to 5 and marked by the letters A to F) been <u>implemented</u>.

If the policy has been fully implemented, please grade its implementation as 10. Please grade the implementation of a policy from 7 to 9, if most of its statements have been implemented. Please grade the implementation of a policy from 4 to 6, if around a half of its statements have been implemented. Please grade the implementation of a policy from 1 to 3, if only a minority of its statements have been implemented. If the policy has not been implemented at all, please grade it as 0.

Policy	0	1	2	3	4	5	6	7	8	9	10	Don't know	N/A
"A"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
"B"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
"C"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
"D"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
"E"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
"F"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

7

Please provide the name of and/or link to the published sources (e.g. journal article, research document, technical report, thesis, dataset) that informed your answer. Please provide this information for each policy that you mentioned in your answers to the questions 1 to 5. Please write "my personal assessment" if your estimations were not informed by any other source.

Policy	**Source(s)**
"A"	
"B"	
"C"	
"D"	
"E"	
"F"	

8

National recommendations are an official consensus statement issued by a governmental body and/or endorsed by the government. Physical activity recommendations typically state how much physical activity is required for health benefits, while sedentary behaviour recommendations typically suggest strategies for reducing prolonged periods of sitting.

Does your country have <u>national recommendations</u> on…

	Yes	No	Don't know
… physical activity?	☐	☐	☐
… sedentary behaviour (i.e. sitting time)?	☐	☐	☐

9

If yes, do they include specific guidelines for…

	Physical activity			Sedentary behaviour		
	Yes	No	Don't know	Yes	No	Don't know
… early years (pre-school age)?	☐	☐	☐	☐	☐	☐
… children and young people (school age)?	☐	☐	☐	☐	☐	☐

	… adults?	☐	☐	☐	☐	☐	☐
	… older adults?	☐	☐	☐	☐	☐	☐
	… pregnant women?	☐	☐	☐	☐	☐	☐
	… people with disabilities?	☐	☐	☐	☐	☐	☐
	… people with chronic diseases?	☐	☐	☐	☐	☐	☐
	Other target groups (please specify or write "no"):						

10	**If your country has national recommendations on physical activity and/or sedentary behaviour for <u>children and young people</u>, please provide information about them.**		
	Physical activity recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommended intensity(ies):	Don't know ☐	N/A ☐
	Recommended duration:	Don't know ☐	N/A ☐
	Recommended frequency:	Don't know ☐	N/A ☐
	Recommended duration of bouts:	Don't know ☐	N/A ☐
	Recommendation for additional benefits:	Don't know ☐	N/A ☐
	Recommended inclusion of vigorous activity:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐
	Sedentary behaviour recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommendation for overall sitting:	Don't know ☐	N/A ☐
	Recommendation for screen time:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐

11	**If your country has national recommendations on physical activity and/or sedentary behaviour for <u>adults</u>, please provide information about them.**		
	Physical activity recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommended intensity(ies):	Don't know ☐	N/A ☐
	Recommended duration:	Don't know ☐	N/A ☐
	Recommended frequency:	Don't know ☐	N/A ☐
	Recommended duration of bouts:	Don't know ☐	N/A ☐
	Recommendation for additional benefits:	Don't know ☐	N/A ☐
	Muscle-strengthening activity recommendation:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐
	Sedentary behaviour recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommendation for overall sitting:	Don't know ☐	N/A ☐

	Recommendation for screen time:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐

12	**If your country has national recommendations on physical activity and/or sedentary behaviour for <u>older adults</u>, please provide information about them.**		
	Physical activity recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommended intensity(ies):	Don't know ☐	N/A ☐
	Recommended duration:	Don't know ☐	N/A ☐
	Recommended frequency:	Don't know ☐	N/A ☐
	Recommended duration of bouts:	Don't know ☐	N/A ☐
	Recommendation for additional benefits:	Don't know ☐	N/A ☐
	Muscle-strengthening activity recommendation:	Don't know ☐	N/A ☐
	Balance and fall prevention recommendations:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐
	Sedentary behaviour recommendations		
	Document name:	Don't know ☐	N/A ☐
	Publication year:	Don't know ☐	N/A ☐
	Recommendation for overall sitting:	Don't know ☐	N/A ☐
	Recommendation for screen time:	Don't know ☐	N/A ☐
	Other recommendations:	Don't know ☐	N/A ☐

13	**Does your country have a national <u>health surveillance or monitoring system</u> that includes measures of…**			
		Yes	No	Don't know
	… physical activity?	☐	☐	☐
	… sedentary behaviour?	☐	☐	☐

14	**Which <u>ministries or departments</u> in your national government have an active role in the promotion of more physical activity and/or less sedentary behaviour?**				
	Ministry/department of:	Yes	No	Don't know	N/A: Please tick if your country does not have this ministry/department
	Health	☐	☐	☐	☐
	Sport	☐	☐	☐	☐
	Recreation and leisure	☐	☐	☐	☐
	Education	☐	☐	☐	☐
	Transport	☐	☐	☐	☐
	Environment	☐	☐	☐	☐
	Urban/rural planning and design	☐	☐	☐	☐
	Culture	☐	☐	☐	☐
	Tourism	☐	☐	☐	☐

	Public finance	☐	☐	☐	☐
	Work and employment	☐	☐	☐	☐
	Research	☐	☐	☐	☐
	Other ministries/departments (please specify or write "no"):				

15	**Does your country have <u>quantifiable national targets</u> (e.g. to increase the prevalence of meeting physical activity guidelines by 15% by 2030) for…**			
		Yes	No	Don't know
	… physical activity?	☐	☐	☐
	… sedentary behaviour?	☐	☐	☐

16	**If yes, please provide information about up to five <u>key targets</u>, including their start and end years.**		
	(1) Target:	Don't know ☐	N/A ☐
	Time frame:	Don't know ☐	N/A ☐
	(2) Target:	Don't know ☐	N/A ☐
	Time frame:	Don't know ☐	N/A ☐
	(3) Target:	Don't know ☐	N/A ☐
	Time frame:	Don't know ☐	N/A ☐
	(4) Target:	Don't know ☐	N/A ☐
	Time frame:	Don't know ☐	N/A ☐
	(5) Target:	Don't know ☐	N/A ☐
	Time frame:	Don't know ☐	N/A ☐

17	**Please estimate how <u>comprehensive</u> is your country's current overall national policy (written, unwritten, or lack thereof) on physical activity and sedentary behaviour.** Comprehensive policy uses multiple strategies for the promotion of more physical activity and less sedentary behaviour (e.g. individual-oriented behaviour change and environmental-focused interventions), covers multiple sectors and settings (e.g. health, sport, transport, and urban planning and design sectors), defines quantifiable targets, contains initiatives for specific population groups (e.g. children, people with chronic disease), includes a public awareness component (e.g. social marketing campaigns), defines the budget for implementation, includes multi-sectoral and/or cross-sectoral approaches, and defines policy evaluation strategies. If the policy contains all of the elements, please grade its comprehensiveness as 10. If the policy contains most of the elements, please grade its comprehensiveness from 7 to 9. If the policy contains around half of the elements, please grade its comprehensiveness from 4 to 6. If the policy contains only a minority of the elements, please grade its comprehensiveness from 1 to 3. If it includes none of the elements, please grade it as 0. **Please provide your rating for...**												
	… physical activity policy.												
	0	1	2	3	4	5	6	7	8	9	10	Don't know	N/A
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	… sedentary behaviour policy.												
	0	1	2	3	4	5	6	7	8	9	10	Don't know	N/A
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

18	**Please provide the name of and/or link to the source of evidence (e.g. evaluation report, journal article, research document, technical report, thesis) that informed your answer. Please write "my personal assessment", if your estimation was not informed by any other source.**

19

Overall national policy is considered to be effective, if, as a result of it, the population's physical activity levels have increased (or remained stable) or the population's sedentary behaviour has decreased (or remained stable) as planned.

It is important to note that some policies may have a direct effect and others an indirect effect. For example, changes in the funding of the national transportation scheme to favour public transport may ultimately result in more utilitarian physical activity, such as walking to and from the tram stop. On the other hand, changes in local policies, such as opening school grounds for public use, may have more direct effects on physical activity levels.

One way to assess the effectiveness of overall policy is to determine whether the quantifiable targets outlined in the policy documents have been met. This information can usually be obtained from policy evaluation reports. If the effects of the national policy have not been formally evaluated (by a government or non-government agency), you may assess its effectiveness based on other available research that investigated the effects of policy on population physical activity/sedentary behaviour.

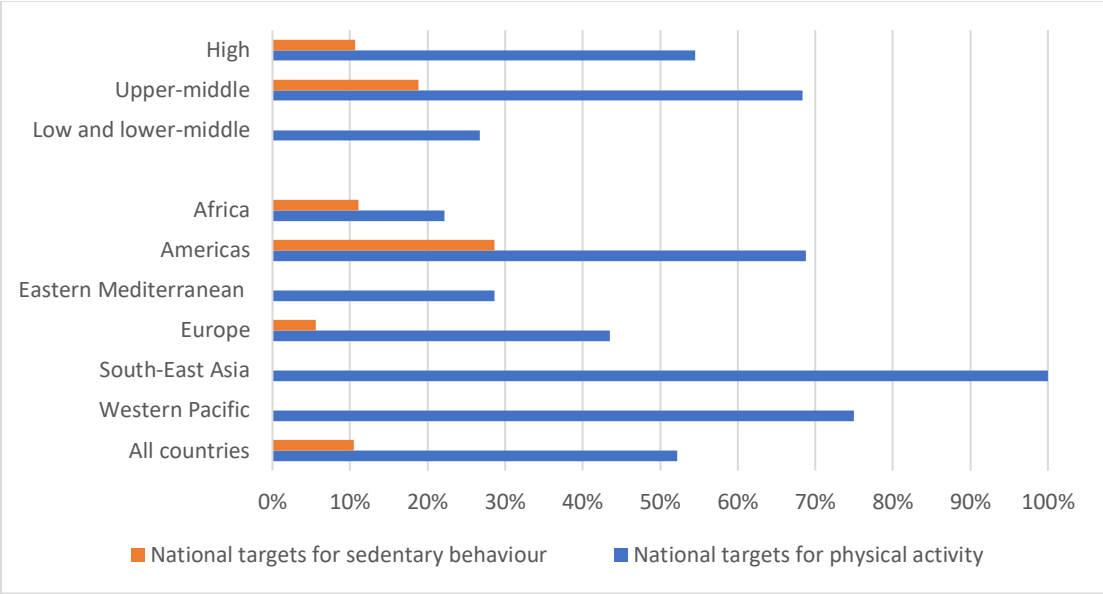
If all targets have been met, please grade the effectiveness of policy as 10. If most targets have been met, please grade the effectiveness of policy from 7 to 9. If around half of the targets have been met, please grade the effectiveness of policy from 4 to 6. If only a minority of the targets have been met, please grade the effectiveness of policy from 1 to 3. If no targets have been met, please grade the effectiveness of policy as 0.

Please estimate how <u>effective</u> has your country's current overall national policy been in…

… increasing population physical activity.												
0	1	2	3	4	5	6	7	8	9	10	Don't know	N/A
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
… tackling population sedentary behaviour.												
0	1	2	3	4	5	6	7	8	9	10	Don't know	N/A
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

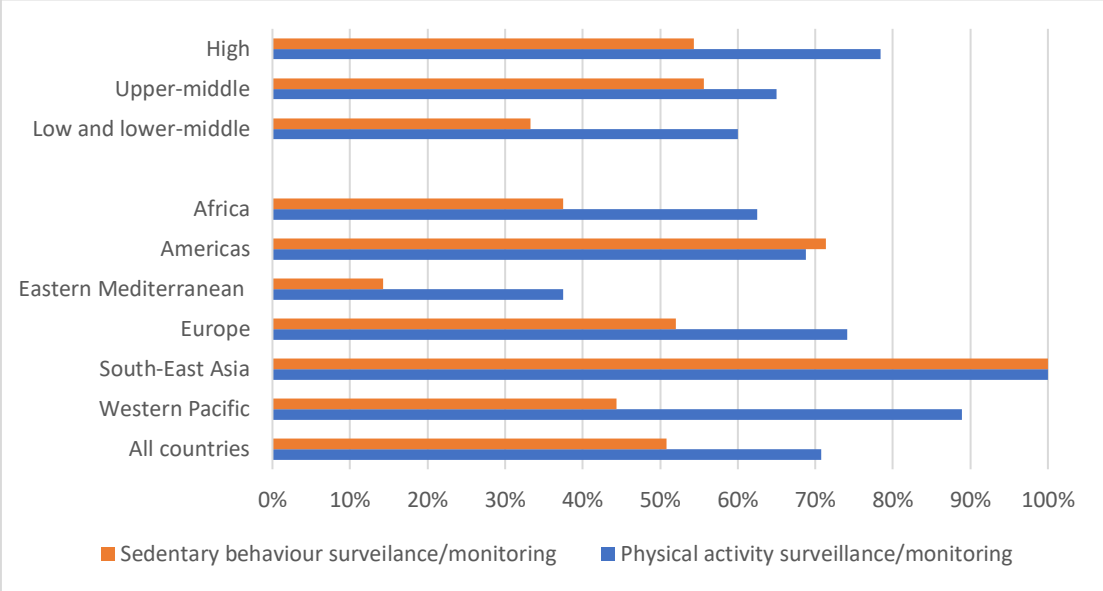
20	**Please provide the name of and/or link to the source of evidence (e.g. evaluation report, journal article, research document, technical report, thesis, dataset) that informed your answer. Please write "my personal assessment", if your estimation was not informed by any other source.**

Appendix E4: Additional file 2: Percentage of countries with targets for PA and SB, by income level and world regions



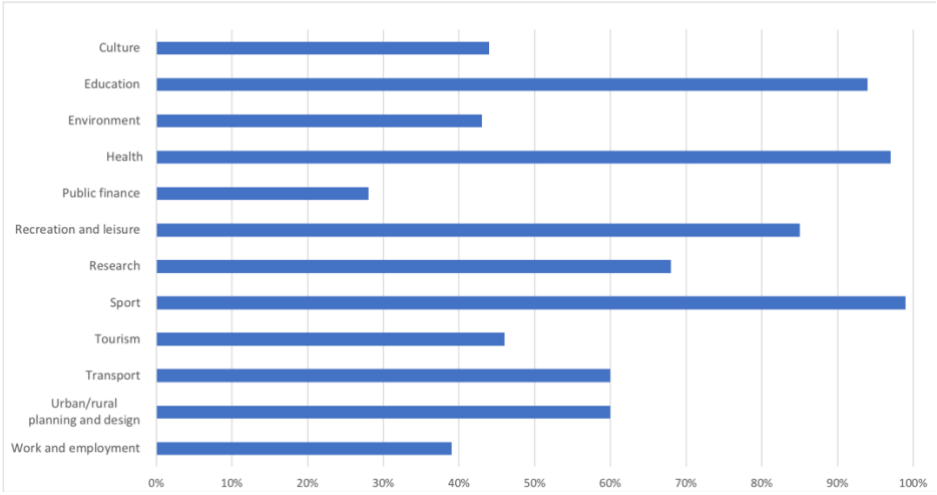
PA: physical activity, SB: sedentary behaviour

Appendix E5: Additional file 3: Percentage of countries conducting PA and SB surveillance/monitoring, by income level and world region



PA: physical activity, SB: sedentary behaviour

Appendix E6: Additional file 4: Percentage of national ministries or departments involved in promotion of more PA and/or less SB



PA: physical activity, SB: sedentary behaviour

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