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Health and wellbeing outcomes of programs for Indigenous Australians that include strategies to enable the expression of cultural identities: a systematic review

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Abstract. Indigenous people have long maintained that strong cultural identities are critical to health and wellbeing. The purpose of this systematic review is to examine whether interventions that entail strategies to enable expression of cultural identities for Australian Indigenous peoples are associated with measurable improvements in health and wellbeing. Peer-reviewed articles that reported quantitatively expressed health and wellbeing outcomes involving Indigenous Australian participants only were included. The cultural intervention component was defined and assessed by Indigenous researchers on the team. A narrative analysis was conducted. The protocol was registered on PROSPERO (CRD420 15027387). Thirteen articles describing eleven studies were identified, including one randomised control trial (RCT), one cluster RCT and two studies with non-randomised controls. Other studies reported on case series or cross-sectional studies. All except two studies described multiple intervention strategies. Eight studies showed significant improvement in at least one psychosocial, behavioural or clinical measure, with two showing a positive direction of effect and one showing no improvement. Publication bias may discourage researchers to report negative findings of these interventions. Although studies vary in quality, this review provides evidence that interventions that include opportunities for expression of cultural identities can have beneficial effects for Australian Indigenous peoples.

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Introduction

The health of Australian Aboriginal and Torres Strait Islander peoples (henceforth ‘Indigenous’ unless referring to a term used in an included paper) is profoundly affected by the legacy of colonisation and dispossession of land. Loss of cultural knowledge and opportunity to practise culture are recognised as central determinants of ill health for many Indigenous people (Commonwealth of Australia 2013).

Culture is notoriously difficult to define; it can incorporate beliefs, religions or ideologies, customs, values, relationships, languages, narratives and practices (Brady 1995; Bond and Brough 2007; Dockery 2010). Australian Indigenous peoples’ cultural practices vary widely and incorporate both pre-colonial and modern practices.

Indigenous communities internationally appear to experience better health and wellbeing where cultural practices have been maintained. Canadian research identifies markedly lower suicide rates in First Nation communities with strong continuity of cultural practices, compared with those where this has not

occurred (Chandler and Proulx 2006). In Australia, participation in traditional cultural practices has been associated with improved educational attainment and employment levels and lower levels of risky alcohol consumption (Dockery 2010). Burgess *et al.* (2009) found a significant association between greater levels of involvement in caring for Country^A and more frequent physical activity, better diet and lower body mass index among community members in remote Arnhem Land.

In colonised North America and Oceania, many programs support and encourage Indigenous people to practise and express cultural identities as a means to improve their health and wellbeing (Brady 1995). A review of cultural interventions to treat addictions in Canadian First Nation populations concludes that cultural activities contribute to healing (Rowan *et al.* 2014; Dell and Acoose 2015).

Australian qualitative studies affirm the value of supporting Indigenous peoples to express cultural identities (Davis *et al.* 2004; Bulman and Hayes 2011; Carey and Russell 2011). Consistent with this, supporting Indigenous people to practise culture is a key component of the Australian Government’s

^A‘Country’ is capitalised in the paper to denote land to which Indigenous people have a unique spiritual and cultural connection.

current plan to improve Indigenous health (Commonwealth of Australia 2013). Nonetheless, little measurable outcome data from cultural healing interventions is available from Australia or elsewhere (Brady 1995; Berry *et al.* 2012; Rowan *et al.* 2014; Dell and Acoose 2015). The purpose of this systematic review is to examine whether interventions, which entail strategies to enable expression of cultural identities for Australian Indigenous peoples, are associated with measurable improvements in health and wellbeing. To the best of our knowledge, no previous Australian systematic review of this nature has been conducted.

Methods

This is a complex review, and developing a method necessitated extensive discussions within the study team, which comprised Indigenous and non-Indigenous researchers. Our approach was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher *et al.* 2009), and we sought to ensure that it was also consistent with guidelines for the appropriate conduct of Indigenous health research (National Health and Medical Research Council 2003). Research parameters and procedures were documented in a protocol that was registered on the PROSPERO database of systematic review protocols (registration number CRD42015027387).

Eligibility criteria

Inclusion criteria were developed using the participant, intervention, comparator, outcome and study design tool (PICOS) (Moher *et al.* 2009).

Included studies described interventions that involved Australian Indigenous participants. We excluded studies of programs that involved Indigenous participants from countries outside Australia. This exclusion criterion was applied because we believed it would be inappropriate for us to assess whether programs should be considered to encourage cultural expression for Indigenous people from countries other than our own. Interventions described in included studies were designed to improve health and wellbeing, and entailed strategies to enable the expression of cultural identities (see below for a definition of this). Evaluations of policies that operated at a population level, such as income management programs, interventions designed to improve workforce capacity and activities implemented as part of educational curriculum in schools, were excluded. Comparators in included studies were either a control arm or pre-post outcomes. Included studies provided outcomes assessed using psychosocial, behavioural or clinical measures for Indigenous Australians only (studies without disaggregated data for Indigenous and non-Indigenous people were excluded). Eligible study designs were randomised controlled trials (RCTs), non-randomised RCTs, cluster RCTs, cross-sectional, case-control and case series. Studies involving fewer than 10 participants were excluded. No limits were set on the year of publication.

Defining a cultural intervention

The three Indigenous researchers on the study team established a working group to determine what would be considered to constitute 'enabling the expression of cultural identities' for the purpose of the review. Culture is expressed and interpreted in

diverse ways by Australian Indigenous individuals and communities context, so the group was reluctant to develop a static or bounded definition (see Morrissey *et al.* 2007). However, we identified that these interventions included those that entailed active practises of sharing knowledge about and expressing culture, strengthening cultural relationships of care, learning languages, expressing culture through art, story and performance, and connecting to Country. Studies were excluded where encouraging cultural practices did not appear central to the design of the intervention. For example, interventions that only depicted Aboriginal artwork on health promotion resources without involving participants in creating art were excluded.

Search strategy

Our search strategy included peer-reviewed articles that were available in English and published before 17 August 2015. The MEDLINE, PsycINFO, CINAHL, Embase, IBSS and Australian HealthInfoNet databases were searched. We also reviewed reference lists from relevant systematic reviews and drew on our own knowledge of research. Our search terms included: Indigenous, Aboriginal, Torres Strait Islander (TSI), Australia, health, health services, social welfare, wellbeing, quality of life and language.

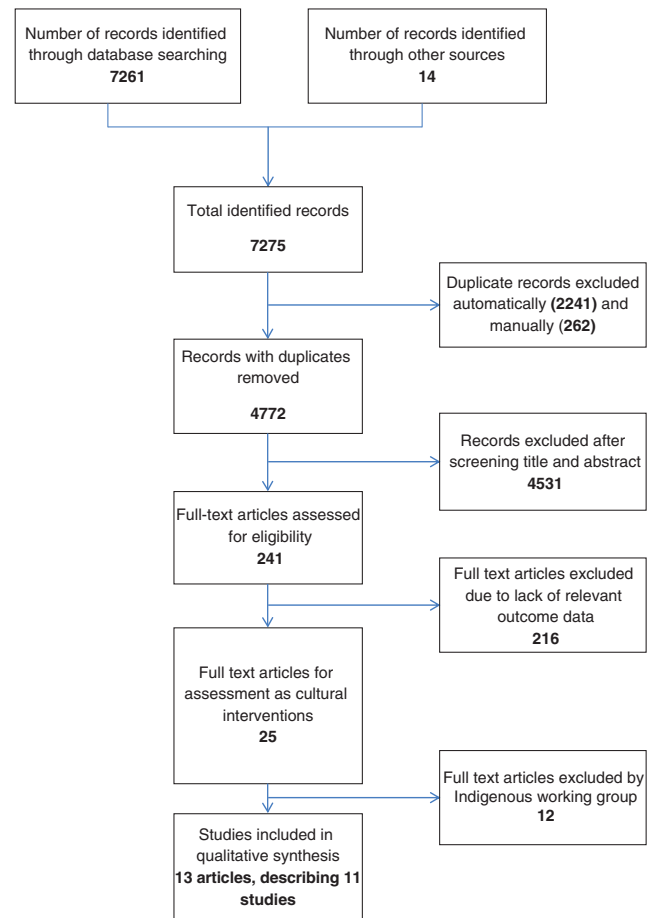


Fig. 1. Literature search and screening process.

The literature search identified a total of 7261 potential records (Fig. 1). After the duplicates were eliminated ($n = 2503$), titles and abstracts for 4772 records were screened by one researcher to exclude opinion pieces, books, book reviews and theses. Any record where there was uncertainty was referred for a second opinion. Full-text articles were then retrieved for 241 articles. A further 216 articles were excluded, mainly because they did not provide relevant outcome data or include a cultural component. The Indigenous researchers then assessed each included study to determine whether it could be considered to describe an intervention that enabled the expression of cultural identity. A further 12 studies were excluded at this point, leaving 13 articles describing 11 studies of interventions. EndNote X7 (Clarivate Analytics, Philadelphia, PA, USA) was used to manage and synthesise the identified citations.

Data extraction and quality appraisal

Australian guidelines emphasise that Indigenous health research should be conducted in accordance with specific principles (see National Health and Medical Research Council 2003). These include inclusion of Indigenous people as researchers, making findings accessible and ensuring that communities benefit from studies in which they participate. Nonetheless, these features are not measured by standard study appraisal tools that are used in systematic reviews (MacLean *et al.* 2015). The study team developed a tool to support data extraction, assessment of study design and risk of bias. It includes questions about study design and outcomes that are common to systematic review tools, with measures expressed in non-technical language wherever possible. Where our tool differs from others is in the inclusion of measures to assess issues of particular relevance to Indigenous health research. For example, the tool includes measures of Indigenous people's involvement beyond participation as research subjects; in designing and implementing interventions and research, as researchers and authors, and through community consultation and feedback. Measures in this section of the tool were designed to examine the degree to which guidelines on good conduct in Indigenous health research were met (National Health and Medical Research Council 2003), focusing on issues of key importance, as identified by Indigenous researchers on our team. The tool is described in greater detail elsewhere (MacLean *et al.* 2015).

Data extraction was completed by two reviewers for each included article. Study design and Indigenous involvement for each included study were classified as high, moderately high, moderate and low. Assessments were made on the basis of information provided in the papers only. Reviewers compared their results and two discrepancies were resolved through discussion. Extracted information was entered into an Access database (Microsoft Corporation, Redmond, WA, USA)

Analysis

A meta-analysis of the results could not be performed due to the differences between reported outcome measures, and thus a narrative synthesis is provided. Where two articles report the

same study and data, the most recent was selected for analysis. As numerous cultural elements in included programs were identified, studies are classified according to whether the intervention described relates primarily to the themes of diet ($n = 3$), physical activity ($n = 4$), birthing ($n = 2$) or emotional wellbeing ($n = 2$).

Results

Of the 11 included studies, nine were based in remote Indigenous communities, with the others reporting on interventions in rural and urban areas. One RCT (Nagel *et al.* 2009), one cluster RCT (Kiran and Knights 2010) and two studies with non-randomised controls (Lee *et al.* 1994; d'Espaignet *et al.* 2003) were included. Other papers report case series or serial cross-sectional data. All except two (O'Dea 1984; Sun and Buys 2013) involved more than one type of intervention. Of all included studies, three were rated as moderately high or high in Indigenous involvement and quality in design, and eight were rated as moderately high or high in study design.

Studies are described in chronological order within each section. A description of the intervention and detailed outcomes for each study is provided in Table 1. We focus here on summarising the main relevant outcomes.

Diet

The earliest study identified in our search was published in 1984. O'Dea (1984) observed marked improvement or normalisation of metabolic signs of type 2 diabetes for 10 Aboriginal people who spent 7 weeks in two remote locations in Western Australia (WA), which were traditional Country to many of them. During the trip, participants hunted or gathered all their food. Changes in metabolic markers were attributed to weight loss, a low-fat diet and increased physical activity.

The Looma Healthy Lifestyle Program was a strongly community-based program in remote WA. Initially focusing on individuals at high risk of chronic conditions, the program evolved to take on a broader population focus. Activities included hunting and fishing, formal and informal education, encouragement for exercise and, eventually, festivals, education in schools and improved food availability. Rowley *et al.* (2001) measured participants' health from baseline to 4 years after implementation, revealing significantly reduced hypercholesterolemia and improvements in other nutritional measures.

Also, targeting diet and the effects of processed Western diets for Aboriginal people, Lee *et al.* (1994) described a remote community-initiated program in the Northern Territory (NT) that was directed by Elders^B. The program entailed encouraging exercise, building on traditional understandings of health to promote improved nutrition and improving the availability of nutritious food in the store. Health outcomes for participants compared with a control community included significant decreases in serum cholesterol and blood pressure, and a reduction in body mass index (BMI).

Studies providing outcomes primarily in relation to diet were all rated as moderately high in their study design, with two (Lee

^B'Elder' is capitalised to acknowledge Indigenous people who are recognised and respected as cultural knowledge holders in kinship systems or by their community.

Table 1. Information about included studies and relevant outcomes

Indigenous involvement in the study and study design was assessed using a specific tool, drawing only on information evident in the papers (****, high; ***, moderately high; **, moderate; *, low). AMU, Aboriginal Medical Service; BMI, body mass index; TAU, treatment as usual; NT, Northern Territory; WA, West Australia; Qld, Queensland

Study reference	Study design	Participants and setting	Cultural intervention (CI) and other intervention (OI) details	Time frame and follow up	Indigenous involvement	Study design	Relevant outcomes
d'Espaignet <i>et al.</i> (2003)	Ecological study using statutory population data.	Records examined for live births for Aboriginal women living in rural and remote top-end communities giving birth in hospital during the study period. Group 1: comprised births from communities where the program was introduced in 1993 ($n = 1406$); Group 2: communities where the program was introduced in 1996 ($n = 1136$); Group 3: other communities without the program ($n = 5188$).	Intervention groups: CI: program involving senior women helping younger women prepare for pregnancy and childbirth, encouragement of nutrition (including bush food). OI: antenatal medical visits. Group 3: TAU including antenatal visits.	1998 – 2001	**	****	Improved trends in average birthweight and the proportion of low birthweight babies for Group 1 communities. Pre-intervention birthweight increased by 135 g for Group 2 ($P < 0.0001$).
Dimer <i>et al.</i> (2013)	Single arm intervention study.	People who attended cardiac rehabilitation program at an AMS in Perth, WA. Outcomes based on those who attended 8 weeks of sessions ($n = 28$).	CI: 'travelling through' country based on kilometres on exercise bikes. Education used 'yarning' techniques. OI: education on diet, cardiovascular disease risk factors and warning signs.	8 weeks, year not stated.	**	****	Decrease in BMI ($P < 0.05$), waist girth ($P < 0.01$) and systolic ($P < 0.01$) and diastolic ($P < 0.05$) blood pressure and increase in 6-min walk test ($P < 0.01$).
Eley <i>et al.</i> (2010)	Two separate single arm intervention studies.	Indigenous people with asthma. Study 1: participants recruited from Townoomba, Qld, by community Elders through letter to schools and through AMS ($n = 66$). Study 2: small community; AMS recruitment only ($n = 74$).	CI: Digeridoo program for males and singing for females, along with storytelling, clap sticks, painting and boomerang throwing. OI: information about asthma management. Study 1: weekly for 26 weeks; Study 2: twice per week for 17 weeks.	Study 1: 26 weeks in 2007; Study 2: 17 weeks in 2009.	**	***	Study 1: two measures of forced expiratory volume improved between pre- and post-tests for senior school boys ($n = 8$; $P < 0.01$). No change in this measure detected in Study 2.
Kiran and Knights (2010)	Cluster randomised control trial.	Indigenous and non-Indigenous students in two control schools ($n = 76$) and two intervention schools ($n = 91$), Townsville, Qld.	CI: traditional Indigenous games program, implemented 1 h a week. OI: provision of sport equipment.	March – May 2007	**	*	No significant change in measures of physical activity or cultural connectedness. Specific outcomes provided for Indigenous participants.

Lee <i>et al.</i> (1994)	Community intervention study.	A total of 94% of adults in a remote NT community (intervention group $n = 154$; control group $n = 310$).	CI: direction by Elders, reinforcing cultural and traditional value of traditional foods, cultural stories about greed used to discourage overconsumption. OI: multiple strategies including improved availability of nutritious food and nutrition education.	June 1989 – June 1990	****	***	Multiple significant changes in biological markers (control data not provided), including 12% reduction in mean serum cholesterol over 1 year ($P < 0.0001$), a decrease in systolic ($P < 0.0005$) and diastolic blood pressure ($P < 0.0001$) and normalisation of BMI.
Nagel <i>et al.</i> (2009)	Nested randomised control trial.	Aboriginal people with chronic mental illness and their carers from three remote island communities in NT, intervention group ($n = 24$), control or late treatment group ($n = 25$).	Intervention group: CI: family engagement, family mapping. OI: psycho education, motivational care planning and TAU. Late treatment group received TAU (assessment, support, counselling and medication) and intervention at 6 months.	18 months during 2004–07	**	****	Treatment group significantly improved wellbeing (measured using Health of the Nation scales) ($P < 0.001$) and reduced alcohol ($P = 0.05$) and other substance use measured through Severity of Dependence Scale.
Nel and Pashen (2003)	Case study in a clinical setting.	Pregnant Indigenous women in remote northern and western Qld.	CI: involving extended family in care. OI: antenatal outreach, restructured care model with shared care clinic in AMS and free ultrasound at 18 weeks.	12 months, January – December 2002	*	*	Comparing the first and second 6 months of 2012; patients presenting to hospital without antenatal care declined from 10 to 2; perinatal mortality declined from eight to two; and clinic attendance increased.
O'Dea (1984)	Single arm intervention study.	10 Aboriginal participants with diabetes from a remote community in WA.	CI: 7 weeks spent on traditional lands eating food that they hunted or collected, with no access to store food or beverages.	7 weeks, 1984	*	***	Mean total weight loss of 8 ± 0.9 kg. Major metabolic abnormalities improved or normalised. Oral glucose tolerance tests showed significant improvements; that is, fasting glucose (11.6 ± 1.2 mmol L ⁻¹ , against 6.6 ± 0.5 mmol L ⁻¹ ; $P < 0.0001$).
Preuss and Brown (2006)	Community case study.	Young Indigenous people who sniffed petrol from a remote NT community. Outcomes state pre-intervention numbers of 70 petrol sniffers.	CI: taking petrol sniffers to Mount Theo, re-establishing cultural relationships and practices. OI: recreational programs in the community.	1996 – 2005	****	**	Number of petrol sniffers in the community reduced from 70 to 0 over a 9-year period. Outcomes reported from unpublished records. Significance tests not conducted.

(continued next page)

Rowley <i>et al.</i> (2001)	Serial cross-sectional study.	All people aged over 15 years in a remote Indigenous community in WA surveyed in 1993–94 ($n = 197$), in 1996 ($n = 181$) and 1997 ($n = 124$).	CI: hunting and fishing. OI: healthy lifestyle program consisting of formal and informal education sessions, exercise groups, dietary advice and later on, sports festivals, community feedback and appointment of community member as a store manager.	1993 – 97	***	***	Outcomes assessed at three time points. Reduced hypercholesterolemia ($P < 0.001$) and improvements in a range of other nutritional measures.
Sun and Buys (2013)	Non-randomised intervention study.	Indigenous participants both healthy and with chronic conditions, aged 18 years and over recruited from five urban, regional and rural communities in Qld ($n = 325$).	CI: Voices United for Harmony Program involving singing to improve aerobic activity and social connection.	12-month period, 2010 – 11	**	**	Singing Activity Participation Questionnaire showed that the intervention group demonstrated significant improvement in exercise participation and health behaviour including smoking cessation ($P < 0.001$) compared with the control group.

et al. 1994; Rowley *et al.* 2001) also seen as moderately high or high in their Indigenous involvement.

Physical activity

Four studies describe programs that entailed physical activity. Kiran and Knights (2010) conducted a small cluster RCT of a program conducted with Indigenous and non-Indigenous students in two intervention and two control primary schools in Townsville, Queensland. Students participated in an hour a week of ‘traditional Indigenous games’, over a 3-month period. The nature of the games is not described. Evaluation detected no significant improvements in physical activity or cultural connectedness (the latter was stratified for Indigenous and non-Indigenous students with no significant differences). The size of the study, short delivery time of the program and shortcomings of the kit that guided its implementation may explain this result.

Eley *et al.* (2010) describe a program to ameliorate asthma in a town (Study 1) and small community (Study 2) in southern Queensland, involving Indigenous participants aged 6–77 years. The two studies employed slightly different recruitment strategies and Study 2 provided a more intensive program. The intervention also involved different strategies for men and women. Men played didgeridoos, whereas women sang and everyone participated in painting and boomerang throwing. Evaluation showed strong qualitative evidence of improved health and wellbeing for many participants. Statistically significant changes were only identified in Study 1 for senior school boys ($n = 8$), using two measures of forced expiratory capacity. Girls in the same age range showed non-significant improvements, perhaps because different music activities were offered to them. No changes in these measures were detected in Study 2. A subsequent paper (Eley 2013) identified that no significant effects were found in two further studies of the same intervention (statistics not provided).

Another program using music to improve chronic diseases outcomes was described by Sun and Buys (2013). This program involved 291 people recruited from five Indigenous communities in Queensland to a community singing program designed to enhance connection to the community and improve aerobic capacity. Little information about the singing program is provided. Of the 291 participants, 76 in the intervention group and 27 in the control group participated in the post-intervention assessment activities. Compared with the control group, participants in the intervention group demonstrated significant improvement in ‘physical and other health-related activities’, reduced medication use, along with a significant increase in social connectedness.

In 2012, Dimer *et al.* (2013) published outcomes from a cardiac rehabilitation program in an Aboriginal Medical Service in Perth, WA. As part of an exercise program, staff tracked participants’ progress on a map so they could envisage where they would have travelled through traditional Country if using a conventional bicycle. Other cultural activities included a yarning methodology for educating participants about risk factors for cardiovascular disease. After 8 weeks, participants recorded significantly reduced BMI, waist girth and blood pressure, and were able to walk a longer distance in 6 min. It is not known whether the 28 program completers on whom these results are

based had the same characteristics as the 98 people who commenced the program.

Two of these studies (Eley *et al.* 2010; Dimer *et al.* 2013) were rated as high or moderately high for study design. The study by Sun and Buys (2013) was rated as moderate on study design, and that of Kiran and Knights (2010) as low. All the studies in this section of the review were rated as moderate for Indigenous involvement.

Birthing

Two included studies show outcomes for antenatal care and birthing. d'Espaignet *et al.* (2003) evaluated the effect of the Strong Women, Strong Babies, Strong Culture program (SWSBSC), which operates in remote Aboriginal communities in the NT. Findings of an earlier evaluation (Mackerras 2001) were also reported in this paper. SWSBSC activated traditional relationships where older Aboriginal women cared for pregnant women, encouraging them to visit medical clinics and providing advice about nutrition (including bush foods). Mean birthweights and the proportion of low-birthweight babies born live in hospital to Aboriginal women during 1998–2001 were compared for the three groups. Group 1 and Group 2 respectively comprised communities where SWSBSC was introduced in 1993 and 1996, whereas Group 3 communities (without SWSBSC) operated as a control. The study involved records of 7730 births. Group 1 communities saw a significant increase in birthweights, with a small and non-significant increase for Group 2. Similar results emerged in relation to the proportion of low-birthweight babies. During the study period, there was no significant change in mean birthweight for the control group.

A much smaller study also identifies improved outcomes for Indigenous mothers and babies. Nel and Pashen (2003) describe a program in a remote area of Queensland. The program involved a new antenatal shared care clinic at an Aboriginal Medical Service, transport to appointments, outreach antenatal visits, improved follow up for patients and free ultrasounds at 18 weeks. To provide a culturally safe environment, extended family members were welcomed to attend antenatal care and the birth. This was the component of care that we regarded as supporting the expression of Indigenous cultural identity. Outcomes measured over 12 months included a decrease in perinatal morbidity from 10 to 2 babies between successive 6-month periods, increased use of clinic services and fewer women giving birth without having accessed antenatal care. Numbers involved were too low to test for statistical significance.

Whereas the study of d'Espaignet *et al.* (2003) was rated as high in study design and moderate for Indigenous involvement, the study by Nel and Pashen (2003) was rated as low on both measures.

Emotional wellbeing

Two studies provide evidence of improvements in emotional wellbeing. Preuss and Brown (2006) evaluated a range of programs to address petrol sniffing, implemented by a remote Central Australian community. Petrol sniffers were sent to Mt Theo outstation, 160 km away from the main community. Indigenous staff with important cultural relationships to the area provided care and education in traditional cultural practices. The

study reports that numbers of petrol sniffers at Yuendumu reduced from 70 to none over a 9-year period. Although this information is sourced from program documents, it is widely corroborated (MacLean and d'Abbs 2002).

Nagel *et al.* (2009) reviewed an intervention adapted for people from remote Indigenous communities in the NT that 'engages with the individual's cultural and psychosocial context'. Using mixed methods, including a RCT, they showed significant improvement in wellbeing measures and decreases in substance use for people receiving the intervention over those in the control group. The intervention group were engaged in activities to strengthen family ties (family engagement, family relationship mapping and goal setting) alongside psycho-education, motivational care planning and treatment as usual (TAU). TAU involved assessment, support, counselling and medication. Control group participants received TAU and the intervention 6 months later.

The study design by Preuss and Brown (2006) was rated as moderate, whereas its Indigenous involvement was regarded as high. Conversely, the study by Nagel *et al.* (2009) was assessed as high in design and moderate for Indigenous involvement.

Discussion

This review shows that programs that include components to enable and support Indigenous peoples to express cultural identity can have positive health and wellbeing effects. Only one included study (Kiran and Knights 2010) showed no improvements associated with activities described. The other 10 showed improvements in at least one measure and at one time point. Of these Eley *et al.* (2010) detected improved outcomes for Study 1 but not Study 2 or for two subsequent iterations of the program. For eight interventions described in the study, observed improvements were statistically significant (O'Dea 1984; Lee *et al.* 1994; Rowley *et al.* 2001; d'Espaignet *et al.* 2003; Nagel *et al.* 2009; Eley *et al.* 2010; Dimer *et al.* 2013; Sun and Buys 2013). Two studies where statistical analyses were not conducted show positive directions of effects in health and wellbeing outcomes (Nel and Pashen 2003; Preuss and Brown 2006) (Table 1).

Studies providing outcomes primarily in relation to diet were all rated as moderately high in study design. Hunting and gathering food offers both exercise and improved nutrition, both of which are likely to have contributed to the improved cholesterol and other metabolic measures noted in three studies (O'Dea 1984; Lee *et al.* 1994; Rowley *et al.* 2001). All were all set in remote communities with few food outlets. Although they provide evidence for the benefits of restricting unhealthy processed food intake and increasing exercise, they may be more difficult to replicate in urban settings.

Studies describing programs related to physical activity had more mixed results than those focused on diet. For one study (Kiran and Knights 2010), this may be related to significant design problems and relatively poor Indigenous involvement. Eley *et al.* (2010) showed improved outcomes only for senior school boys in one of two described studies. The study related to physical activity with the most highly rated design (Dimer *et al.* 2013) showed a range of significant clinical improvements. However, even this study only reported outcome data for a small proportion of those who commenced the program.

The SWSBSC (rated as high for study design) provides evidence for the efficacy of an approach that activates traditional cultural relationships to improve birthing outcomes (d'Espaignet *et al.* 2003), with less rigorous support from the other included study (Nel and Pashen 2003). Birthing programs that encourage cultural relationships of care should be replicable, provided sufficient resourcing and the availability of supportive family members to provide care.

Preuss and Brown (2006) identify impressive results from a series of interventions involving cultural activities implemented to reduce petrol sniffing. The program was possible due to the willingness of Elders to care for young people on their land, and was not suited to evaluation though a controlled design. The study design by Nagel *et al.* (2009) was assessed as high, and positive effects of interventions described on mental health and substance use were triangulated with qualitative data.

Cultural elements in the included studies were diverse. They include visiting Country and cultural sites (O'Dea 1984; Preuss and Brown 2006), education in traditional cultural practices (Preuss and Brown 2006), hunting, fishing and eating bush foods (O'Dea 1984; Rowley *et al.* 2001), traditional games (Kiran and Knights 2010) yarning (an Indigenous mode of talking) and sharing cultural stories (Lee *et al.* 1994; Dimer *et al.* 2013), mapping and activating cultural relationships of care (d'Espaignet *et al.* 2003; Nel and Pashen 2003; Nagel *et al.* 2009), reinforcing Elder authority (Preuss and Brown 2006) and painting, dancing, playing instruments and singing as a community (Dimer *et al.* 2013; Sun and Buys 2013). Programs were implemented in a range of locations. These included places that are usually considered to be culturally safe, such as on Country or at Aboriginal community-controlled health services, and also in mainstream school and health settings. Some of the programs described reflect an understanding of culture as dynamic, incorporating adaptations to modern urbanised lifestyles. For example, encouraging Indigenous cardiac rehabilitation patients to use exercise bicycles by mapping their progress across Country (Dimer *et al.* 2013) shows how traditional culture can be practised using contemporary technologies.

This review has limitations. Few included studies utilised randomised designs and four were rated as moderate or poor in study design (Nel and Pashen 2003; Preuss and Brown 2006; Kiran and Knights 2010; Sun and Buys 2013). All except two studies (O'Dea 1984; Sun and Buys 2013) described interventions that entailed multiple strategies, including conventional medical or health promotion approaches alongside cultural elements. This means that we cannot determine the specific effect of cultural elements in the included studies. Importantly also, we were restricted to providing a narrative analysis due to the diversity of approaches, study quality and outcome measures. The generally positive health and wellbeing outcomes reported here may reflect publication bias. In light of the importance given by many Indigenous people to cultural interventions, it may well be awkward to publish the results of programs where benefits to participants were not apparent. It is also possible that we excluded studies because cultural elements were not described in sufficient detail for us to make an accurate assessment. Clearer descriptions of the program and activities in future research will help others replicate successful approaches (Berry *et al.* 2012).

Systematic reviews such as this tend to be narrowly focused and we excluded studies of cultural interventions where specific outcomes for Indigenous people were not provided. For example, Berry *et al.* (2012) conducted a study of 57 Indigenous and 46 non-Indigenous participants in a residential substance abuse treatment program, which included education about ancestry, cultural respect, hunting and gathering, language, storytelling, identity, artwork, music, weapons and dance. Participants also visited culturally significant sites. Those completing 16 weeks of the program achieved a reduction in psychological distress, improved belief in their capacity to refuse substances and feelings of empowerment. Indigenous clients indicated significantly more frequently than their non-Indigenous counterparts that they found the cultural treatment components of the program useful. The paper does not provide differentiated psychosocial, behavioural or clinical outcomes for Indigenous participants, therefore, we could not include it here.

A further important limitation is the exclusion of studies reporting on qualitative data only. Many compelling qualitative descriptions of effects of interventions on people's lives attest that the benefits of cultural approaches to improving health and wellbeing cannot be encapsulated by numerical measures alone (Davis *et al.* 2004; Morrissey *et al.* 2007; Bulman and Hayes 2011; Carey and Russell 2011). Our intention in excluding studies providing only qualitative outcomes from this review is not to undermine their value, but rather to provide a different lens on the effect of cultural interventions on health and wellbeing. Future reviews could examine qualitative studies to identify which components of cultural interventions are most likely to be effective.

This paper documents adaptations to standard systematic review procedures, which we developed to assist us in conducting the study in accordance with advice on Australian Indigenous health research (National Health and Medical Research Council 2003). These adaptations included establishing a working group of Indigenous researchers to assess studies and developing a new study appraisal tool. Given the centrality of Indigenous knowledge to the study of cultural interventions, it is disappointing that only three studies included in the review (Lee *et al.* 1994; Rowley *et al.* 2001; Preuss and Brown 2006) were assessed as demonstrating a high or moderately high level of Indigenous involvement. This may be because Indigenous involvement in other studies was more extensive than reported. It is important to provide this information to assist others working in Indigenous health research to interpret overall study quality. A detailed description of methods and Indigenous involvement could be provided as supplementary online information where journal word lengths prohibit inclusion in papers.

To the best of our knowledge, this is the first Australian systematic review of quantitative outcomes of cultural interventions designed to improve Indigenous people's health and wellbeing. The review identifies improvements in psychosocial, behavioural and clinical measures associated with many but not all programs of this nature. It shows that programs, which include cultural strategies addressing diet, physical activity, birthing and emotional wellbeing, can improve outcomes for Indigenous peoples. Evidently, the evidence base that is available to draw on in formulating conclusions here is small and the outcomes described vary. Further reviews will be

required as new studies that describe cultural interventions become available. Nonetheless, the review provides evidence to support arguments that Indigenous health interventions should continue to incorporate strategies that enable people to express cultural identities.

Conflicts of interest

The authors have no conflicts of interest to declare.

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