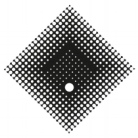

An overview of Australian exercise and sport science degrees

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An overview of Australian exercise and sport science degrees

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Exercise and Sport Science (EXSS) is a common degree offered at Australian universities, yet there is no systematic overview of this multidisciplinary field of study. This study aimed to determine the broad curriculum content of Australian EXSS degrees by summarizing the units offered, identify most commonly delivered content areas, and capture course information such as work-integrated learning (WIL) requirements and majors offered. Data were gathered through publicly available university course pages, with 30 EXSS courses included and only core units identified. The most common Australian EXSS units were "Exercise Physiology," "Biomechanics," "Research Methods and Data Analysis," "Exercise Prescription and Delivery," and "Exercise and Sport Psychology." WIL requirements ranged from 140 to 300h per course, and five courses offered majors. This study provides an overview of Australian EXSS courses, with the focus on exercise-related components reflecting accreditation requirements. Future research should examine how these courses equip students for the multidisciplinary EXSS industry.

KEYWORDS

higher education, sport science, exercise science, curriculum, work-integrated learning

1. Introduction

Undergraduate course offerings in Exercise and sport science (EXSS) are common in Australian universities, and these courses are typically multidisciplinary, enabling accreditation in specialized areas (Stevens et al., 2018; Spittle et al., 2021). As this area is multidisciplinary in nature, there has been debate as to whether EXSS practitioners should specialize in a particular area or diversify their skillset (McCunn, 2019). Exercise and Sports Science Australia (ESSA, 2021a) differentiates Exercise Scientists and Sport Scientists with separate accreditations. ESSA (2022) defines an Exercise Scientist as a practitioner who can "apply the science of exercise to design and deliver physical activity and exercise-based interventions to improve health, fitness, well-being, performance and assist in the prevention of injury and chronic conditions." ESSA (2021b) defines a Sport Scientist as a professional who "provides expert advice and support to athletes and coaches to help them understand and enhance sports performance; adopting evidence-based, quality-assured practice to evaluate and develop effective strategies or interventions in training and/or competition," emphasizing a holistic approach Sport Scientist tertiary education developing foundation knowledge in a range of areas including biomechanics, motor learning, physiology, and psychology. Whereas ESSA (2021b) differentiates Exercise and Sport Science in their accreditation, The British Association of Sport and Exercise Sciences (BASES) defines EXSS in a combined manner as "the application of scientific principles to sport and exercise, achieved through one of the following three branches of science (biomechanics,

physiology, psychology), or through interdisciplinary approaches" (BASES, 2022). Bruce et al. (2021) outline there may be a stronger focus on technical skill development in these degrees to follow accreditation requirements.

There are a range of factors that influence curriculum development in higher education, with a key driver for curriculum design being employability and skills (Roberts, 2015). The focus may also shift throughout an undergraduate program, for example, with more focus on cognitive skills for thinking and learning in the first year, shifting to professional outcomes/skill development in the final year (Roberts, 2015). From a theoretical perspective, curriculum is constructed by social forces, in that content delivered (i.e., units of study) reflects dominant values (Penney, 2013; Spittle and Spittle, 2016). This is a circular process, whereby content delivered shapes direction of the profession, and content delivered is defined by current practice trends (Kirk, 1992). Similar to Physical Education (PE; Kirk, 2009), the definition of EXSS is broad. In PE, practical and theoretical knowledge are segmented (Penney, 2013), with barriers also existing between theoretical knowledge and practical applications in EXSS (Fullagar et al., 2019). This may be an issue in curriculum content, as the ability to apply technical knowledge in a practical setting is a key skill for EXSS practitioners (Bruce et al., 2021). There is currently limited understanding of the range of curriculum content offered in Australian EXSS courses. This is required to determine how well-equipped graduates are for the diversity of roles in the industry, considering that Stevens et al. (2018) reported 30% of graduates in Australia are not currently employed in the EXSS industry.

There are a range of career options for EXSS students upon completion of their degree, with the most common Australian industry roles being exercise physiologist, strength and conditioning coach, sport scientist, high performance manager, sport physiologist, or academic (Dwyer et al., 2019). A key motivation for students entering an EXSS degree is their desire to remain involved in sport (Spittle et al., 2021). Despite this, EXSS students often have limited understanding of career opportunities before entering the workforce (York et al., 2014). Consequentially, many students enrolling in EXSS may view this degree as a foundation degree to pursue the range of postgraduate options available to allow specialization in this diverse field (Spittle et al., 2021).

To inform higher education providers of EXSS courses with knowledge of how to cater their degree to the profession and prepare their students, Bruce et al. (2021) surveyed applied and academic Australian sport scientists on key skills and attributes necessary to operate in EXSS effectively. The study identified technical skills such as applying knowledge to the demands of the sport/athlete and contemporary discipline-specific knowledge to be the most vital. Furthermore, communication was the highest rated transferable skill for sport scientists. To highlight the importance of communication, Waters et al. (2019) described the sometimes dysfunctional relationship between biomechanics professionals who were reported to have poor communication skills, and sporting coaches who have a poor understanding of the discipline and the services it provides. Despite the strong emphasis on developing scientific knowledge in EXSS courses, the need to develop the ability to communicate this knowledge to relevant stakeholders (e.g., coaches, athletes/clients, and other professionals) seems just as important.

Literature has suggested work-integrated learning (WIL) opportunities are an important time to develop key work skills that may be difficult to develop in the university setting (Malone, 2017). WIL can help to facilitate a smooth transition into the workforce, developing communication and interpersonal skills and allowing students to engage in meaningful tasks (Piovani et al., 2020). For example, transferable skills such as communication, which are rated very importantly (Bruce et al., 2021), may be attained in WIL (Malone, 2017). Despite this, it seems to be integral that curriculum affords students opportunities to develop communication and practical skills in the classroom. For example, Bruce et al. (2021) recommended further development of interpersonal skills in the EXSS curricula, where students can practice training real clients as opposed to only their peers, supplementarily to WIL.

While research has investigated the curriculum of similar undergraduate programs such as PE (Spittle and Spittle, 2016), highlighting the segmentation of curriculum structure into distinct units of study, there is limited objective understanding of the Australian EXSS. For instance, it is unknown what content areas are covered (i.e., units) and where certain content areas are positioned in the 3-year EXSS delivery. Beaumont et al. (2016) reported EXSS students decreased in confidence over the course of their degree, but perceived an increase in their own employability. This may relate to findings of the importance for sport scientists of Bruce et al. (2021) to apply contemporary discipline-specific knowledge, whereby EXSS students have high technical knowledge, but lower confidence to apply this knowledge.

To summarize, there is a growing literature base on key attributes, career intentions, and outcomes for EXSS graduates. However, there is limited understanding of Australian EXSS degree content given the multidisciplinary nature. Further, it is unknown whether accreditation bodies such as ESSA are leading to uniformity or differences between EXSS courses. Therefore, the primary aim of this brief research report is to determine the broad curriculum content of Australian EXSS degrees by summarizing the range of core units offered, and identifying the most commonly delivered content areas to provide foundational understanding of the curriculum. Secondary aims include summarizing key course information of Australian EXSS degrees, including work-integrated learning opportunities, majors, and accreditations offered given these may be integral learning experiences for sport scientists.

2. Methods

2.1. Search and inclusion/exclusion criteria

Data were gathered through publicly available university course pages. An initial search on the website of each Australian university using the following terms was conducted; "exercise and sport science degree," "exercise science degree," "sport science degree," and "human movement degree." For the purpose of this study, only one EXSS degree from each Australian university was included to reduce bias. If a university offered multiple degrees, the more general/less specialized degree was selected. For example, a degree with title such as "Bachelor of Exercise and Sport Science" would be included over "Bachelor of Health Science (Human Movement)" or "Bachelor of Exercise Science." Inclusion criteria for this study included 3-year full-time equivalent study load, to focus on 3-year entry-level courses. Degrees were not included if they resulted in Accredited Exercise Physiologist

(AEP) accreditation with ESSA without further study such as a Masters qualification.

2.2. Variables collected

The primary data collected for this project included core unit names and year level in the degree. Units were only included in the analysis if they were considered a core (i.e., essential) unit, due to the range of electives on offer at different institutions, with the number of core units per degree identified. Through the same course webpages, WIL requirements (hours required) were collected, alongside additional descriptors such as course majors, to determine the number of courses including majors and what were the most common options. Finally, any embedded accreditations were identified.

2.3. Mapping process

To begin the mapping process, the first author (AK) extracted all data (listed above) from course webpages and inputted into a Microsoft Excel database. As unit titles for each course offering may differ slightly, two authors (AK and CS) independently identified and grouped common units across institutions. For example, "health research methods" and "evidence-based health practice" units were grouped as "research methods and data analysis." The unit descriptions and associated learning outcomes (publicly available *via* the university course webpages) were consulted to group similar units. This resulted in two independently developed lists of common unit names ($n = 89$, $n = 83$ for each author, respectively), with the lists generated moderated by a third author (MS), resulting in 58 total distinct units. A similar process has been used in previous research investigating PE curriculum content (Spittle and Spittle, 2016), where there may be some overlap in similar common unit names. All authors then participated in a round-table discussion further refining the list into units that distinguishable from each other by learning outcomes and topics learned. Following this process, a total list of 65 distinct units were included for analysis. This number increased, due to some units previously grouped together now differentiated due to distinguishable learning outcomes.

Units were grouped under the ESSA Professional Standards (ESSA, 2021a), given these standards provide clear unit areas. These underpin both Exercise Science and Sports Science accreditations within ESSA. The 14 areas are Professional Practice, Biomechanics, Exercise Physiology, Exercise Prescription and Delivery, Functional Anatomy, Growth and Development, Human Anatomy, Human Physiology, Motor Learning and Control, Nutrition, Physical Activity for Health, Psychology of Health and Exercise, Research Methods, and Data Analysis (ESSA, 2021a). Units that included a second offering were classified as "Advanced."

2.4. Data analysis

A Microsoft Excel database captured unit titles, majors offered, WIL hours, and additional accreditations for each University offering. Descriptive statistics were used to summarize all data of this exploratory study using Microsoft Excel.

3. Results

Thirty Australian universities (out of 43 in Australia) offered at least one EXSS course for inclusion in this study, with 65 distinct units of study included. Table 1 displays the percentage of institutions delivering units under each domain of the ESSA AES professional standards, and the distribution of units by year delivered (i.e., year 1, 2, and 3).

The most common units identified included were "Exercise Physiology" (offered in 100% of courses), "Biomechanics" (100%), "Research Methods and Data Analysis" (93%), "Exercise Prescription and Delivery" (90%), and "Exercise and Sport Psychology" (90%). The domains with the highest number of core units were Exercise Physiology ($n = 59$), Psychology of Health and Exercise ($n = 55$), Exercise Prescription and Delivery ($n = 53$), and Biomechanics ($n = 52$). There were 21 units identified in this study in the "Other" category, as they fell outside each of the domains.

3.1. Secondary aims: Course information

Figure 1 illustrates the number of core units offered per course, with one university offering 15 core units (and nine non-core), and six university courses offering a fully-prescribed set of 24 core units (0 electives) across the degree. Hence, 24 universities (80%) included non-core in their course. Five universities (17%) offered majors; with "Exercise Science" the most commonly offered major title. Of these course offerings, two universities offered two majors, one offered three majors, one offered five majors, and one offered 11 majors.

Of the 30 course offerings included, 24 reported the WIL hours required (mean = 177 h). The minimum number of WIL hours reported was 140, with 16 universities stipulating 140 h required. The maximum required amount of hours reported was 300.

All universities offered Exercise Science Accreditation with ESSA within 2 years of completing the degree. In terms of other accreditations offered, two courses reported both Australian Strength and Conditioning Association (ASCA) and Fitness Australia (now known as AUSactive) as accreditations attainable through the course. Through completion of the EXSS course, one university reported ASCA accreditation, one university reported Sports Medicine Australia (SMA) accreditation, and another university reported Certificate IV in Fitness. Twenty-five courses did not report on specific additional accreditations offered beyond ESSA.

4. Discussion

The primary aim of this exploratory study was to determine the broad curriculum content of Australian EXSS degrees by summarizing the range of units offered, and identifying the most commonly delivered content areas to provide foundational understanding of Australian EXSS higher education curriculum content. The most common units of study in Australian EXSS courses were "Exercise Physiology" (offered in 100% of courses), "Biomechanics" (100%), "Research Methods and Data Analysis" (93%), "Exercise Prescription and Delivery" (90%), and "Exercise and Sport Psychology" (90%). EXSS degrees within Australia tend to be prescriptive in terms of core units offered compared to electives, with 19 of 30 courses included in

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TABLE 1 Distribution of individual units by year level.

ESSA AES domains and unit titles	Percentage institutions (/30) offering units	Distribution of units within each ESSA AES standard by year delivered		
		Year 1 *n*	Year 2 *n*	Year 3 *n*
Professional practice				
Career development (WIL + Class)	53%	0	4	12
Career development (WIL + Class) (Advanced)	13%	0	0	4
Career development (No WIL)	10%	3	0	0
WIL only	40%	0	0	12
WIL only (Advanced)	7%	0	0	2
Ethics/Professional practice	33%	2	2	6
Ethics/Professional practice (Advanced)	7%	1	1	0
Total *n* = 49		6	7	36
Biomechanics				
Biomechanics	100%	6	22	2
Biomechanics (Advanced)	70%	0	8	13
Biomechanics (Advanced II)	3%	0	0	1
Total *n* = 52		6	30	16
Exercise physiology				
Exercise physiology	100%	3	27	0
Exercise physiology (Advanced)	80%	0	8	16
Exercise physiology (Advanced II)	17%	0	1	4
Total *n* = 59		3	36	20
Exercise prescription and delivery				
Exercise prescription and delivery	93%	3	19	6
Exercise prescription and delivery (Advanced)	50%	0	6	9
Exercise prescription and delivery (Advanced II)	7%	2	0	0
Exercise for special populations	23%	0	0	7
Exercise for special populations (Advanced)	3%	0	0	1
Total *n* = 53		5	25	23
Functional anatomy				
Functional anatomy	87%	14	12	0
Total *n* = 26				
Growth and development				
Growth, development and aging	53%	14	1	1
Total *n* = 16				
Health and exercise assessment				
Health and exercise assessment	37%	4	5	2
Health and exercise assessment (Advanced)	3%	0	0	1
Total *n* = 12		4	5	3
Human anatomy				
Human anatomy	50%	13	1	1
Human anatomy (Advanced)	3%	0	1	0
Human anatomy and physiology*	67%	19	1	0
Human anatomy and physiology (Advanced)*	40%	12	0	0
Total *n* = 48		44	3	1

(Continued)

TABLE 1 (Continued)

ESSA AES domains and unit titles	Percentage institutions (/30) offering units	Distribution of units within each ESSA AES standard by year delivered		
		Year 1 *n*	Year 2 *n*	Year 3 *n*
Human physiology				
Human physiology	53%	14	2	0
Human physiology (Advanced)	17%	4	1	0
Total *n* = 21		18	3	0
Motor learning and control				
Motor learning and control	70%	3	14	4
Motor learning and control (Advanced)	17%	0	1	4
Motor control	27%	0	4	4
Motor learning and skill acquisition	30%	0	5	4
Total *n* = 43		3	24	16
Nutrition				
Nutrition	43%	9	3	1
Nutrition for sport and exercise	67%	4	3	13
Total *n* = 33		13	6	14
Physical activity for health				
Physical activity for health	67%	13	5	2
Total *n* = 20				
Psychology of health and exercise				
Psychology of exercise and sport	90%	3	16	8
Psychology of exercise and sport (Advanced)	13%	0	0	4
Psychology for health	30%	3	2	4
Psychology	37%	9	2	0
Neuroscience	13%	0	2	2
Total *n* = 55		15	22	18
Research methods and data analysis				
Research methods and data analysis	93%	14	12	2
Research and evidence based practice	33%	2	0	8
Research and evidence based practice (Advanced)	3%	0	0	1
Research and study skills	20%	5	0	1
Total *n* = 45		21	12	12
Other				
Biochemistry for exercise and sport	7%	2	0	0
Chemistry	3%	1	0	0
Foundations of sport and exercise science	47%	14	0	0
Foundations of sport and exercise science (Advanced)	7%	2	0	0
Health care in Australia	33%	3	4	3
Health promotion	20%	1	5	0
Indigenous and rural populations	7%	1	0	1
Indigenous and rural populations (Advanced)	3%	0	0	1
Injury prevention and management	37%	0	2	9
Pathology	6%	0	2	0
Performance analysis and sport analytics	17%	1	2	2

(Continued)

TABLE 1 (Continued)

ESSA AES domains and unit titles	Percentage institutions (/30) offering units	Distribution of units within each ESSA AES standard by year delivered		
		Year 1 *n*	Year 2 *n*	Year 3 *n*
Physics	3%	1	0	0
Sociology	20%	5	0	1
Sport administration	10%	2	0	1
Sport coaching	7%	2	0	0
Sport coaching (Advanced)	3%	0	0	1
Sport management	3%	1	0	0
Strength and conditioning	40%	2	9	1
Strength and conditioning (Advanced)	7%	0	1	1
Strength and conditioning (Functional fitness)	3%	0	1	0
Theology	3%	1	0	0
Total		39	26	21

*Units that combine human anatomy and physiology were included under human anatomy, as ESSA domains differentiate these into two unique domains.

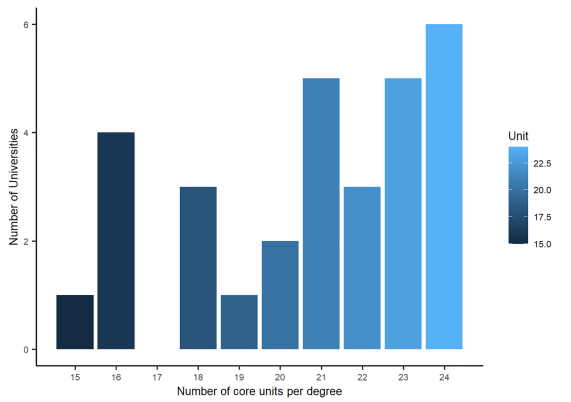

FIGURE 1
Distribution of universities by number of core units within Exercise and Sport Science (EXSS) degree.

the study specifying more than 20 core units in a 24-unit degree. There was some variance between the course offerings for majors included (five courses included these), WIL hours required per course (range: 140–300), and specific accreditations beyond ESSA embedded within the course (five courses included additional industry accreditations).

The most common units of study in Australian EXSS degrees were "Biomechanics" and "Exercise Physiology," which featured in every course as a core unit. Sport science practitioners rate the most important technical skill to be analyzing the demands of the sport and capabilities of the athlete (Bruce et al., 2021), emphasizing the importance of "Exercise Physiology." Eighty percent of courses offered more than one "Exercise Physiology" unit, often with the second offering relating to sport physiology and this key technical skill. The postgraduate ESSA qualification is an AEP, which may influence the importance placed on "Exercise Physiology" in undergraduate programs that can lead to this accreditation. The next most common were "Research Methods and Data Analysis," "Exercise Prescription and Delivery," and "Exercise and Sport Psychology," in 93, 93, and 90% of courses, respectively. Traditionally, physiology, biomechanics, and psychology are foundational disciplines for EXSS (Sewell et al., 2012), so it is not surprising these areas remain fundamental to Australian EXSS degrees, and represent some of the most common units to this day. Ten percent of courses did not include an "Exercise and Sport Psychology" core unit, however, these courses did include a more general "Psychology" or "Psychology for Health" unit, where learning outcomes related more to behavior change and health.

Units in Exercise Prescription and Delivery likely reflect the increasing emphasis on ESSA professional standards relating to the practical skills needed to demonstrate competence in the AES Scope of Practice (ESSA, 2022). Indeed, the revised ESSA AES Standards in 2013 emphasized professional practice and delivery of exercise services (ESSA, 2013), and Exercise Prescription and Delivery continues to be one of the key sub-disciplines in current AES Professional Standards published in 2021 (ESSA, 2021a). Another common core unit identified is "Motor Learning and Control," delivered across 70% of offerings. Within this area is motor learning and skill acquisition, which was considered the most important sport science discipline by employers and coaches sport scientists (Stevens et al., 2021). Despite the importance deemed by employers and coaches, the total units offered in this domain is 43, less than other prevalent areas such as "Exercise Physiology" ($n = 59$), "Psychology of Health and Exercise" ($n = 55$), "Exercise Prescription and Delivery" ($n = 53$), and "Biomechanics" ($n = 52$). Within these domains, there is some variance in how these content areas delivered between courses. For example, some courses combine "Motor Learning and Control" (70% of courses), whereas others differentiate these sub-areas, with 27% of courses including a "Motor Control," and 30% offering a "Motor Learning and Skill Acquisition" unit. Although motor learning and control is considered a vital discipline area, there are very few employed skill acquisition specialists, with Dwyer et al. (2019) reporting four employed skill acquisition specialists of 175 total survey responses. This reinforces findings of Bruce et al. (2021), where many Australian sport science roles were more general in nature, with discipline-specific roles often only available in well-funded organizations.

The results of this project suggest a heavy exercise-focus throughout the degree, in comparison to sport. This may be due to increasing accreditation standard in Australia to ensure high standards of professional competency (Spittle et al., 2021), and the high number of roles available as an Accredited Exercise Physiologist (AEP), typically requiring a postgraduate Masters qualification in this area (Stevens et al., 2018). It is interesting to note this, given few students begin an EXSS degree with the intention of pursuing AEP, and most universities promote exercise scientist and sport scientist as career paths for prospective students, yet few graduates are employed in these roles (Stevens et al., 2018). Stevens et al. (2018) reported the second most common EXSS-related role for graduates was personal trainer/fitness leader. There was a large emphasis on "Exercise Prescription and Delivery" units (93% of courses), yet only 40% included "Strength and Conditioning." One course included a "Strength and Conditioning (Functional Fitness)" unit. One university reported graduates being able to obtain a Certificate IV in Fitness and Health, which would assist students gaining employment as a personal trainer. To promote student engagement in first year, Spittle et al. (2021) recommended more sport-related units. Results of this study, however, identified less than half (47%; all in first year) of courses offered "Foundations of Sport and Exercise Science." Similarly, only two universities offered a "Sport Coaching" unit. Bruce et al. (2021) reported that practitioners in EXSS-related roles perceived managing athletes and support staff more significantly important than those in academic-related roles did. Despite this perceived importance by practitioners, few courses offered "Sport Administration" (10%) or "Sport Management" (3%) units. More research is required to identify students' perceived importance of different units such as these in their employability and subsequent career.

Although there were 65 distinct core units identified within Australian EXSS courses, there appears to be similarity across most degrees in units delivered, with 20 of 65 total units offered at less than 10% of universities. For instance, six courses offered a fully prescribed set of 24 units, yet only 17% of the EXSS courses provided an opportunity for students to specialize in a "major," so there is an opportunity for more courses to explore including majors to allow their students to specialize further in a specific area. Bruce et al. (2021) highlighted data to be a growing area in the EXSS industry, yet no courses offered a data analytics (or similar) major. Future research could determine if studying a major in an EXSS course improves employability. This could have benefits for both the graduates, who can more easily differentiate themselves from other practitioners, as well as the industry, which could offer clients a broader range of services. However, this diversity may also contribute to the perception that EXSS degrees are too general, where they exist predominantly as a pathway degree for students to then move into postgraduate study (Spittle et al., 2021). Studies have suggested EXSS graduates in the sport science setting are not considered worthy of paid employment, and are required to undertake internships to further develop their skills before they can meaningfully contribute to an organization (York et al., 2014; Doncaster, 2018). This notion of requiring internships is on top of the minimum of 140 h WIL practice embedded in all courses. Perhaps greater specialization (and therefore diversity) within EXSS courses could avoid this outcome.

In addition to building foundational knowledge, it has been recommended for EXSS courses to provide students opportunities to develop transferable skills, as practitioners consider these highly important and rate higher than those working in academia (Bruce et al., 2021). WIL opportunities are considered to be an opportunity to develop these transferable skills (Malone, 2017), as it can be difficult to acquire transferable skills through in-class activities (Bruce et al., 2021). Furthermore, Bartlett and Drust (2021) proposed that WIL is an important means of developing knowledge translation of concepts learned in a scientific degree such as EXSS, to be applied in a practical setting. These opportunities may enable students to develop key interpersonal skills by working with real-world clients as opposed to their peers only (Bruce et al., 2021). There was a range of WIL requirements in the current study, with 16 of the 30 universities stipulating 140 h required for WIL in the degree, but other universities ranging in requirements, with the maximum reported required amount of 300 h of WIL. These could be vital opportunities for students to develop experience, as a key barrier to employment in EXSS perceived by coaches included lack of practical applications and experience (Stevens et al., 2021). Courses offered WIL opportunities differently, with 40% offering WIL only as a unit without a complimenting "Career Development" class, yet 53% of courses included a combined unit of WIL and "Career Development" class. Students may not have an understanding of careers available in EXSS by completing WIL only (York et al., 2014), suggesting further research is required to understand how combining "Career Development (WIL + Class)" facilitates understanding of career options. To compliment WIL, there may be opportunities for programs to embed more opportunities to build these vital transferable skills, and subsequent employability.

Malloy et al. (1994) reported few Australian and American EXSS courses included ethics units, considered vital for practitioners to manage interactions ethically in their role. The results of this study confirm this for Australian EXSS courses, where only 33% include an "Ethics/Professional Practice" unit. These units may assist key transferable skills such as using appropriate communication techniques, and technical skills such as practicing ethically in sport science (Bruce et al., 2021). Most universities (83%) did not specify additional industry accreditations offered in the course information. It may be beneficial for students' employability to include these throughout the degree to enable students to gain practical experience. Most units in the Professional Practice domain (36 of 49 total) are in the third and final year of the course structure, suggesting students may not be obtaining vital practical experience in earlier years.

Although this brief research provided a contemporary descriptive account of Australian EXSS courses, there are several limitations. This study was specific to Australia, and it is unclear whether results are unique to contextual factors in Australia such as accreditation requirements. Future research could explore curriculum content in other countries such as United Kingdom where accreditation is common (BASES, 2022), or United States where AEP accreditation is not as common (Berry et al., 2020). Only core units were included in this study, as course designers considered these essential and studied by all EXSS students, regardless of majors, minors, or electives chosen. However, there are other unit areas in majors, minors, and electives, which although not core units, could be considered important for EXSS. Further, this descriptive study is based on university websites, assessed units based on available title, learning outcomes, and unit descriptions. This is a macro review of course content, and does not allow distinguishing between specific content variations. Previous research has indicated that EXSS may be perceived EXSS as a broad

degree, so graduating with an EXSS degree may not be worthy of paid employment in the industry (York et al., 2014; Doncaster, 2018). Future research could consult EXSS stakeholders about how modifications to content structure in EXSS could enable students graduating with a 3-year EXSS degree to develop skills and knowledge to meet professional industry requirements. Further studies could statistically analyze the content of specific courses in relation to the career profiles of students in these courses. Finally, future studies could explore the student perspective as to how specific units prepare them for their future work.

5. Conclusion

This exploratory study aimed to determine the broad curriculum content of Australian EXSS degrees by summarizing the range of units offered, and identifying the most commonly delivered content areas to provide foundational understanding of the content of Australian EXSS curriculum. Units in Australian EXSS courses were diverse, with 65 different units (i.e., topic areas) identified across 30 different courses. The most common units identified included were "Exercise Physiology" (offered in 100% of courses), "Biomechanics" (100%), "Research Methods and Data Analysis" (93%), "Exercise Prescription and Delivery" (90%), and "Exercise and Sport Psychology" (90%). Soft skills are a key area for development in EXSS programs, with a range of WIL requirements, ranging from 140 to 300 h per course. There was variety in how units were offered in EXSS courses, with five universities offering majors to allow specialization in a specific area, whereas six Universities offered a prescribed set of units. This provides a foundational study for future research to analyze and compare ESS offerings across the globe such as United Kingdom and United States, and delve deeper into Australian EXSS curriculum understanding. Future research should consider students' perceptions on the content of the course, and understand the importance of the curriculum design for employment outcomes.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

AK, CS, RL, SS, and MS contributed to the conceptual development of this project. AK collected the data and wrote the introduction, methods, part of the results, and part of the discussion. AK and CS initially analyzed the data, with MS moderating this process, along with SS. RL completed final analysis and writing and presentation of the data in the results. CS wrote the part of the discussion. MS proofed the first draft. CS, SS, and RL provided editing and revising for the final version. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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