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Review article

The impact of sport and physical activity programs on the mental health and social and emotional wellbeing of young Aboriginal and Torres Strait Islander Australians: A systematic review

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ABSTRACT

This review aimed to identify and assess existing evidence of the impact of sport and physical activity programs on mental health and social and emotional wellbeing outcomes within young Aboriginal and Torres Strait Islander people. The review also aimed to highlight limitations of current practice within the research area. A systematic search of literature was undertaken on three peer-reviewed databases (PsycINFO, MEDLINE and SPORTSDiscus) and grey literature from January to March 2021. Studies were included if they described a sport and physical activity program for young (10–24 years) Aboriginal and Torres Strait Islander people and reported mental health or social and emotional wellbeing outcomes. Seventeen studies were selected for this review. Within these studies, the most commonly reported outcomes were related to psychosocial development (N = 12) and a sense of connectedness (N = 12). Mental illness related outcomes (N = 1) were rarely reported, as were substance use (N = 2) and social and emotional literacy (N = 1). Promising outcomes included increased connection to culture, self-esteem and confidence. Nonetheless, due to indirectness and suboptimal study design the precise impact on these outcomes could not be determined. A relevant evidence base is emerging on the impact sport and physical activity programs have on the mental health and social and emotional wellbeing of young Aboriginal and Torres Strait Islander people. However, further research that utilises robust, culturally appropriate methodologies and tools needs to be undertaken before the effects of sport and physical activity programs can reliably be discerned.

1. Background

In Australia, sport and physical activity (PA) has been promoted as a panacea to address health and social disparities in Aboriginal and Torres Strait Islander communities who have been adversely affected by colonisation (Evans et al., 2015; Menzies, 2019). Sport and PA hold particular significance to Aboriginal and Torres Strait Islander people as they provide opportunities for communities to reconnect with environment and culture, promoting social and emotional wellbeing (SEWB). The culturally embedded concept of SEWB can be understood as "a positive state of mental health and happiness associated with a strong and sustaining cultural identity, community, and family life that provides a source of strength against adversity, poverty, neglect, and other challenges of life" (National Mental Health Commission, 2013, pg 2). Key indicators of SEWB include self-efficacy, resilience, cultural identity, isolation and loneliness, discrimination, life stressors and social wellbeing (Australian Institute of Health and Welfare, 2009). For many young Aboriginal and Torres Strait Islander people, sport becomes an integral way to overcome social inequities and find a sense of empowerment through opportunities to participate and excel (Tatz, 2012). The value of sport and PA as a development tool has been recognised by the Australian Government in the formation of the *Sport: More than just a game* (House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs, 2013) report in which eleven recommendations are made, among them: to promote sport as a vehicle to 'close the gap'. This is to be achieved through sustained and targeted sports

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programs, as well as an overarching framework of service delivery and evaluation.

Although sport and PA are clearly valued amongst young Aboriginal and Torres Strait Islander communities, it has not translated to adherence of PA guidelines across the lifespan. Aboriginal and Torres Strait Islander children engage in healthy levels of PA; however, this reduces with age. PA levels reduce at such a rate that Aboriginal and Torres Strait Islander people are less active than non-Indigenous people during adolescence and into adulthood (Australian Bureau Of Statistics, 2020; Evans et al., 2018). As per Australian PA guidelines children and young people aged 5–17 years are recommended to participate in at least 60 min of moderate to vigorous intensity PA every day. Physical inactivity during adolescence is an important modifiable risk factor associated with several preventable chronic diseases that are prevalent in Aboriginal and Torres Strait Islander people. As such, Aboriginal and Torres Strait Islander youth are at a higher risk of developing diseases and illnesses such as obesity, diabetes, cancer, anxiety and depression within their lifetime (Shepherd et al., 2012; Twizeyemariya et al., 2017).

An international systematic review that examined positive youth development in Aboriginal sport and PA, identified positive developmental opportunities for youth to thrive (Bruner et al., 2016). For instance, sport has the potential to incorporate Aboriginal values and traditions, whilst promoting cultural connectedness, education and important life skills that "enable individuals to succeed in the different environments in which they live" (Danish et al., 2004, pg. 2). It may also strengthen resiliency and instil values such as honesty, courage and respect which have been reported to positively impact the holistic sense of SEWB in Indigenous people (Bruner et al., 2019; Cargo et al., 2007; Lavallée and Lévesque, 2013). Research by Dalton et al. (2015) also found similar positive associations between exercise and mental wellbeing within an Australian setting. The authors found that young Aboriginal and Torres Strait Islander people who were involved in sport were 1.6 times more likely to have no serious mental illness and 3.5 times more likely to report good health than those who were not. Nonetheless, a limited amount of research which focuses on young Aboriginal and Torres Strait Islander people's participation in sport and PA effectively examines its' relationship with mental, SEWB (Macniven et al., 2019; Macniven et al., 2017). At present the literature base is heterogeneous with a high proportion of explorative, qualitative research designs (Macniven et al., 2019; Macniven et al., 2017). Although there is immense value in these qualitative approaches, a lack of experimental and mix method methodologies has meant the effect size of programs have not been rigorously captured. Furthermore, literature reviews related to the topic lack critical appraisals and consequently may overestimate the strength of findings (Macniven et al., 2019; Macniven et al., 2017).

Given the evidence that participation in sport and PA improves youth mental health (Janssen and LeBlanc, 2010; Pascoe et al., 2020), it is reasonable to suggest that increasing participation may reduce symptoms of mental illness and subsequently youth mortality. While youth, in general, tend to experience higher rates of mental ill-health, suicide and self-harm, young Aboriginal and Torres Strait Islander people bear a double burden due to personal and systemic legacies of racism, trauma and grief (Australian Institute Of Health Welfare, 2018, Orygen, 2018; Hall et al., 2020). Adolescent Aboriginal and Torres Strait Islander mortality rates are twice that of non-Indigenous adolescents (Azzopardi et al., 2018). Deaths are predominantly through self-harm, with 80% considered to be preventable (Azzopardi et al., 2018). These statistics are reflective of the intergenerational trauma experienced by young Aboriginal and Torres Strait Islander people and suggest a need for programs to improve SEWB and mental health in which sport and PA could play an integral role.

1.1. Objectives

This systematic review aims to 1) systematically identify and assess existing evidence of the impact of sport and PA programs on mental health and SEWB outcomes within young Aboriginal and Torres Strait Islander people and 2) highlight the limitations of current research practice and program development within the field. This review will be the first to synthesise available evidence on mental health and SEWB promotion through sport and PA programs, specifically within a young Aboriginal and Torres Strait Islander population. As such, the results of this review have the potential to make a significant contribution to Aboriginal and Torres Strait Islander health promotion, informing future practice for a priority population.

2. Materials and methods

This systematic review adheres to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009). A systematic review protocol has been published on Open Science Framework (Identifier: DOI https://doi.org/10.17605/OSF.IO/MTKHQ).

2.1. Search

Building upon existing search strategies within the area of research (Macniven et al., 2019; Murrup-Stewart et al., 2019), two authors (ME & SD) conducted an electronic database search to enable a multidisciplinary search outcome. Searches in three electronic databases were undertaken from January to February 2021: PsycINFO, MEDLINE and SPORTSDiscus. Databases were selected due to their diverse disciplines, aiming to reduce unnecessary duplication in yielded search results. Grey literature was also searched from February to March 2021, focusing on government and organisational websites related to Aboriginal and Torres Strait Islander people's health, youth health and sport. Grey literature resources included: Australian Indigenous HealthInfoNet, The Centre of Best Practice in Aboriginal and Torres Strait Islander Suicide Prevention, Lowitja Institute, Australian Institute of Aboriginal and Torres Strait Islander Studies, Australian Sports Commission, Australian Institute of Family Studies, Australian Institute of Health and Welfare, Telethon Kids Institute and Clearinghouse for Sport. Reference lists of all identified reports and articles were searched for additional studies. The following Boolean search string was used on all databases: (Aborigin* OR Torres Strait OR Indigenous* OR First People) AND (Child* OR Youth OR Adolescent OR Young People) AND (Sport OR Physical Activi* OR Exercise* OR Recreation OR Game) AND (Resilience OR Self* OR Development OR Social and Emotional Wellbeing OR Mental Health OR Wellbeing OR Health OR Cultur* OR Communit* OR Connectedness OR Psychological OR Psychosocial OR Depression OR Stress* OR Anxiety OR Substance Use). A location filter Australia was applied where possible.

2.2. Eligibility criteria

Articles were included if they 1) focused on young Aboriginal and Torres Strait Islander people (10–24 years) or contained at least a 50% sample population who identified as Aboriginal and Torres Strait Islander or provided a separate analysis 2) were a sport or PA program 3) reported mental health or SEWB outcomes (qualitative or quantitative). For the purposes of this review, the previously cited National Mental Health Commissions' definition of SEWB was used (National Mental Health Commission, 2013). In addition, the term 'mental health outcomes' was defined as mental health symptoms, as well as, general indicators of mental health such as quality of life and wellbeing. (Kelly et al., 2018) For example, symptoms of depression and anxiety, stress, mood, substance addiction, self-esteem, resilience, confidence and self-concept may be such indicators. No study design or publication date restrictions were imposed on the search; however, studies were required to be published in English. The inclusion criteria for this review were designed to be broad to optimise the yield of appropriate search returns,

with the expectation a limited number of studies would be eligible.

2.3. Study selection

All references were stored in reference management software (EndNote version X8) and duplicates removed. References were then imported into Covidence (Mavergames, 2013) for assessment of eligibility. Study titles and abstracts were screened by two independent reviewers (ME & SD) based on the aforementioned inclusion criteria. Once titles and abstracts were screened, remaining potential articles were viewed by full text. Conflicts in the study selection process were resolved by a third reviewer (LW). Data was extracted from included studies and imported into an Excel spreadsheet created for this review by one research member (ME). A second reviewer (SD) verified data extraction results. The following information was extracted from studies: publication details, program characteristics (program brief, location, setting, involved organisations and health promotion approach) and study evaluation components (participants, study aims and methods, outcomes of significance and findings). When extracting geographical location data, the Australian Standard Geographical Classification System (ASGC) (Department of Health, 2020) was used to determine level of remoteness (Table S1). Health promotion approaches were identified and coded according to the Ottawa Charter framework (World Health Organisation, 1986) as previously utilised by Canuto and colleagues in their scoping review of Aboriginal and Torres Strait Islander health promotion programs focused on modifying chronic disease risk factors. (Canuto et al., 2021) The use of the Ottawa Charter and its five action area within programs were appraised according to adapted definitions from Fry and Zask (2016) (Table S2).

2.4. Risk of bias assessment

In line with existing Aboriginal and Torres Strait Islander sport and PA reviews, the Mixed Methods Appraisal Tool (MMAT) 2018 (Hong et al., 2018) was used to assess the methodological quality of included studies. The MMAT is an appraisal tool designed specifically for qualitative, quantitative and mixed studies. Each study methodology undergoes a screening process and then evaluated based on criteria specific to their research design. As per recommendations, a score of each study has not been given instead, a summary of MMAT quality appraisal results has been tabulated in the form of statements and results categorised according to how many criteria were met.

Additionally, The Aboriginal and Torres Strait Islander Quality Appraisal Tool (Harfield et al., 2020) was utilised to complement MMAT results and enhance cultural rigour. The tool privileges Indigenous knowledge, values and principles for ethical research, addressing many of the epistemological and ontological issues associated with completing systematic reviews in Indigenous health (Harfield et al., 2020). The Aboriginal and Torres Strait Islander Quality Appraisal Tool consists of 14 questions which examine critical factors when undertaking primary research focused upon Indigenous Australians. Results from analysis have also been tabulated in the form of statements and summarised according to how many 'Yes' responses.

2.5. Cultural paradigms

To further enhance cultural rigour and ensure Aboriginal and Torres Strait Islander 'ways of knowing' were incorporated into this review, Nakata's notion of cultural interfaces (Nakata, 2007) was used to limit dominant Westernised epistemologies. Cultural interfaces refer to the intersection of Western knowledge systems and Aboriginal and Torres Strait Islander positions and experiences, of which both have idiosyncratic value (Nakata, 2007). It provides individuals working in Indigenous research opportunities for insight, reflexiveness and learning. In alignment with Indigenous data sovereignty interests and research principles it was important that Aboriginal and Torres Strait Islander people were represented in the research team. Within the research team, JE identifies as Aboriginal. Importantly, JE was integral in the application of cultural interface theory and cultural capacity building amongst team members. Specifically, JE shared knowledge regarding the culturally embedded concept of SEWB and revised the review's search strategy to ensure it aligned with cultural perspectives. Furthermore, JE provided critical revision of the study to promote a strengths-based approach.

3. Results

3.1. Study selection

Database searches retrieved 910 results, which was reduced to 397 after application of a location filter. An additional 10 studies were identified through other sources (grey literature and reference lists). After duplicates were removed 376 titles and abstracts were screened of which 36 progressed to full text viewing. Seventeen studies (Dinanthompson et al., 2008; Hayhurst et al., 2016; Kickett-Tucker, 2008; Kiran and Knights, 2010; Lee et al., 2008; Lonsdale et al., 2011; Macniven et al., 2018; Malseed et al., 2014; Morgan, 2010; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018; Stewart et al., 2014) met inclusion criteria (Fig. 1) whilst nineteen were excluded from this review (Table S3).

3.2. Description of included studies

Table 1 summarises key program characteristics of included studies. In terms of geographic location, eight programs were delivered in Queensland,(Dinanthompson et al., 2008; Kiran and Knights, 2010; Macniven et al., 2018; Malseed et al., 2014; Parker et al., 2006; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018) New South Wales four (Morgan, 2010; Peralta et al., 2014; Rynne, 2016; Rynne and Rossi, 2012), Northern Territory three (Lee et al., 2008; Peralta et al., 2018; Peralta and Cinelli, 2016), South Australia three (Rynne, 2016; Rynne and Rossi, 2012; Stewart et al., 2014), whilst Victoria (Rynne, 2016; Rynne and Rossi, 2012) and Western Australia (Hayhurst et al., 2016; Kickett-Tucker, 2008), delivered two. One program was delivered nationwide (Lonsdale et al., 2011). Six programs (Malseed et al., 2014; Morgan, 2010; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016) were classified as being delivered in major cities, two programs had classifications of inner regional (Rynne, 2016; Rynne and Rossi, 2012), and four in outer regional (Kiran and Knights, 2010; Parker et al., 2006; Rynne, 2016; Rynne and Rossi, 2012). Two programs (Dinanthompson et al., 2008; Macniven et al., 2018), were identified as operating in very remote areas and five that were unable to be classified due to specific locations not being disclosed. Of these unclassified programs, three stated they operated in urban localities (Kickett-Tucker, 2008; Lonsdale et al., 2011; Stewart et al., 2014), two in regional (Lonsdale et al., 2011; Stewart et al., 2014), and four in remote (Lee et al., 2008; Lonsdale et al., 2011; Peralta et al., 2018; Peralta and Cinelli, 2016). Schools were the most common setting for programs to be hosted and delivered in with nine programs (Hayhurst et al., 2016; Kickett-Tucker, 2008; Kiran and Knights, 2010; Lonsdale et al., 2011; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Stewart et al., 2014), followed by community sites which hosted five (Lee et al., 2008; Macniven et al., 2018; Parker et al., 2006; Rynne, 2016; Rynne and Rossi, 2012). Community sport (Dinanthompson et al., 2008), community health service (Skerrett et al., 2018) and broader education settings (Malseed et al., 2014) were also reported. Intersectoral collaboration was well established within fifteen programs (Dinanthompson et al., 2008; Hayhurst et al., 2016; Kickett-Tucker, 2008; Kiran and Knights, 2010; Lonsdale et al., 2011; Malseed et al., 2014; Morgan, 2010; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett

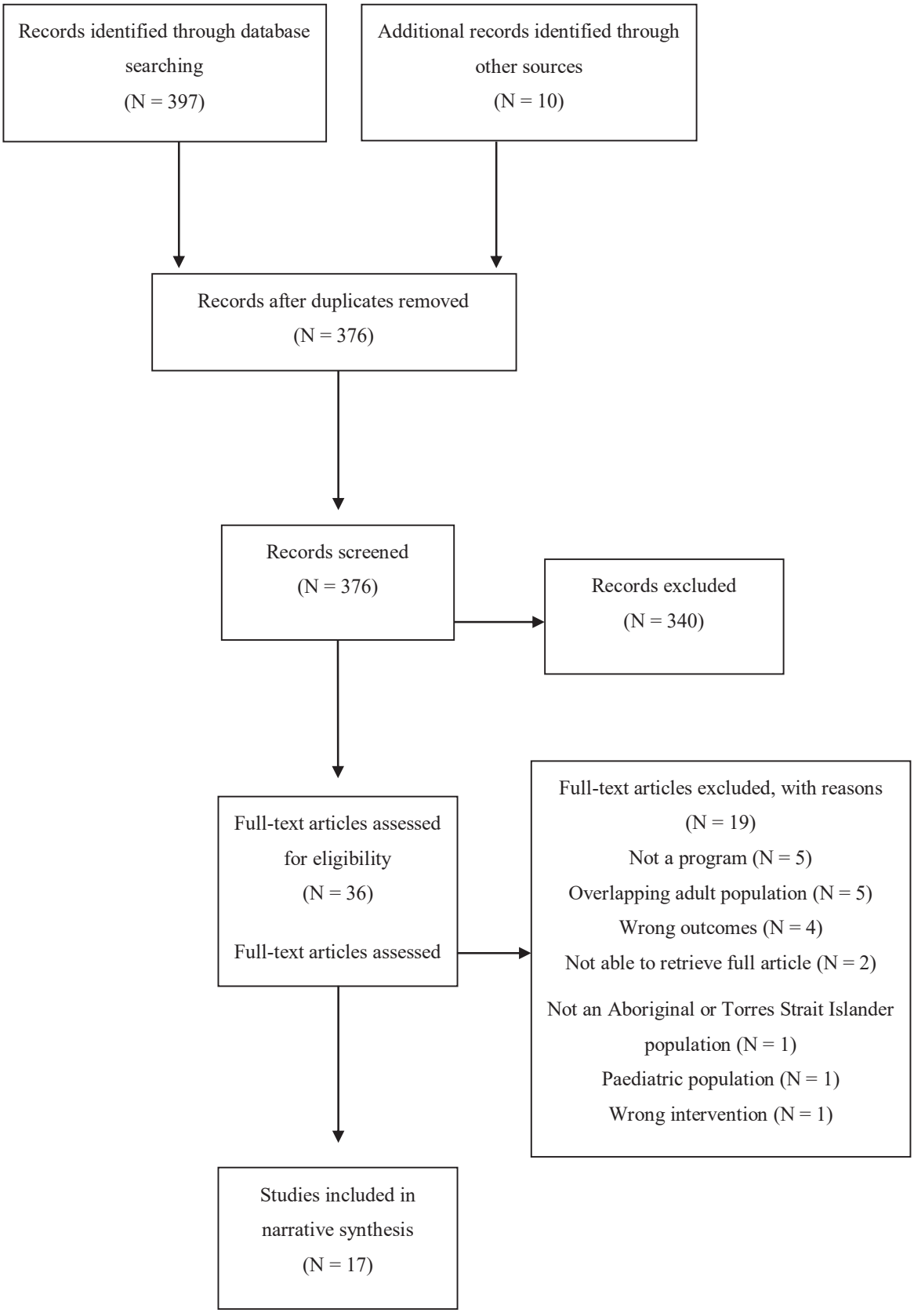

Fig. 1. PRISMA flow diagram of systematic search and included studies.

Table 1
Program Characteristics.

Publication	Program brief	Location and setting	Organisations involved	Health promotion strategy
(Dinanthompson et al., 2008)	The Kickstart program built off existing participation in Auskick programs. The program incentivised involvement by offering a representative pathway for students. Students were required to meet set guidelines in hope to promote healthy life skills, positive attitudes and educational outcomes.	RA 5 (QLD) Community sport setting.	AFL Cape York, local schools, Queensland Health, Queensland Police, Apunipima Cape York Health Council and the Queensland Cancer Fund.	Develop personal skills and strengthen community action.
(Hayhurst et al., 2016)	The Girls Academy program targeted young Aboriginal females experiencing marginalisation or disadvantage. The program aimed to help participants realise their full potential. The program included a range of physical activities but primarily focused on basketball.	RA 1 (WA) Also available in NT and NSW but sites were not listed. School setting.	Role Models and Leaders Australia, local schools and corporate sponsors: Nestlé and Barrick Gold Corporation.	Create supportive environments and develop personal skills.
(Kickett-Tucker, 2008)	Set in a naturalistic setting, students were involved in the school's sport program (intra school sport, inter school sport and/or physical education). No specific program was developed to be evaluated.	ASGC unknown - Urban (WA) School setting.	School.	Create supportive environments.
(Kiran and Knights, 2010)	The Traditional Indigenous Games program required participants to be involved in one hour of Indigenous games for twelve weeks. The program was delivered by teachers who received specific training in the program.	RA 3 (QLD) School setting.	Schools and Queensland government.	Create supportive environments.
(Lee et al., 2008)	The Youth Development Unit provided a range of training, recreational and cultural activities to young people within a community development framework.	ASGC unknown - Remote (NT) Community setting.	Youth Development Unit consisting of Indigenous community members and local service providers.	Develop personal skills and strengthen community action.
(Lonsdale et al., 2011)	The Sporting Chance Program used sport-based education strategies and academies to engage Aboriginal students in their schooling. The objective of the program was to encourage improved educational outcomes.	Nationwide - Urban, regional and remote areas. School setting.	Academy providers, Department of Education, Employment and Workplace Relations and schools.	Create supportive environments.
(Macniven et al., 2018)	The Indigenous Marathon Program used local role models and running to promote healthy lifestyles in Indigenous communities. Twelve young Indigenous people were selected to compete in a marathon whilst also undertaking vocational courses in health, fitness and running coaching.	RA 5 (QLD) Community setting.	Indigenous Marathon Foundation.	Develop personal skills and strengthen community action.
(Malseed et al., 2014)	Deadly Choices is a multi-component program delivered once a week for seven weeks. Facilitated by young Indigenous healthy lifestyle workers, participants are encouraged to positively influence the health choices of their peers, family and community.	RA 1 (QLD) Education setting.	The Institute for Urban Indigenous Health, local education centres and schools.	Develop personal skills and strengthen community action.
(Morgan, 2010)	Sunset Surfers was a pilot school holiday program aimed at building resilience in children from disadvantaged backgrounds. The program consisted of two-hour surf lessons, transport to and from the beach and post program picnics. The program has a combined child protection, physical and mental health promotion framework	RA 1 (NSW) Community setting.	Community-based family support services and government agencies.	Develop personal skills, reorient health services and strengthen community action.
(Parker et al., 2006)	The Our Games, Our Health initiative introduced traditional Aboriginal games to local schools and community groups. Using traditional games as a 'cultural thread', the project brought together the communities' own resources to develop and integrate the project and enhance PA in a meaningful way.	RA 3 (QLD) School and community settings.	Queensland University, Health Promotion Queensland – Queensland Health and schools.	Create supportive environments and strengthen community action.
(Peralta et al., 2014)	The community and school sport program consisted of curriculum aligned lessons on life skills, PA and sport, cultural understanding and career/workplace knowledge. The program was delivered by teachers or community experts, aiming to enhance educational outcomes.	RA 1 (NSW) School setting.	Schools, Indigenous community organisation and local business representatives.	Create supportive environments,develop personal skills and strengthen community action.
(Peralta and Cinelli, 2016)	Designed and coordinated by an ACCO the aim of the program was to engage Aboriginal youth in school and educational pursuits through the use of sport. Program facilitators are known as role models and work closely with school staff to support classroom activities and teach	ASGC unknown - Remote (NT) School setting.	ACCO and schools.	Create supportive environments and develop personal skills.

(*continued on next page*)

Table 1 (*continued*)

Publication	Program brief	Location and setting	Organisations involved	Health promotion strategy
	physical education, sport and health lessons, and co-curricular sport sessions.			
(Peralta et al., 2018)	Secondary evaluation of a youth program designed and coordinated by an ACCO. The program is the same as identified in Peralta et al. (2016).	ASGC unknown - Remote (NT) School setting.	ACCO and schools.	Create supportive environments and develop personal skills.
(Rynne, 2016)	Established and long running targeted Aboriginal surfing programs. The programs are the same as those identified in Rynne & Rossi (2012).	RA 3 (QLD), RA 2 (NSW), RA 1 (NSW), RA 1(VIC) and RA 3 (SA). Multiple community settings.	Surfing Australia, school, local council, state surfing bodies and Aboriginal community organisations.	Develop personal skills and strengthen community action.
(Rynne and Rossi, 2012)	Targeted Aboriginal surfing programs across five different sites. Programs were diverse in their history, structure, format and delivery. Some programs took a more formal approach utilising surf camps and competitions, whilst others were more relaxed and contained 1.5 lessons with provided food and drink.	RA 3 (QLD), RA 2 (NSW), RA 1 (NSW), RA 1(VIC) and RA 3 (SA). Multiple community settings.	Surfing Australia, school, local council, state surfing bodies and Aboriginal community organisations.	Develop personal skills and strengthen community action.
(Skerrett et al., 2018)	The United Health Education and Learning Program consisted of an hour education session, an hour PA and a meal with nutritional advice. Four culturally appropriate health topics were discussed: being healthy, being loved and safe, personal growth, and cultural and spiritual healing.	RA 1 (QLD) Community health service setting.	Headspace Inala, Suicide Prevention and Mental Health Program - Inala Elders Aboriginal Torres Strait Islander Hospital Corporation and Griffith University.	Develop personal skills, reorientate health services and strengthen community action.
(Stewart et al., 2014)	The Aboriginal Power Cup aimed to enhance students' commitment to conventional activities and assist them in developing a 'stake in conformity'. The program consisted of a football tournament and activities such as workshops on leadership, health, career pathways and Indigenous culture.	ASGC Unknown - Urban and regional (SA)School setting.	South Australian Attorney-General's Department, Port Adelaide Football Club and the South Australian Aboriginal Sports Training Academy.	Develop personal skills.

et al., 2018; Stewart et al., 2014) , involving organisations from more than one sector. Seven (Malseed et al., 2014; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018) Aboriginal Community-Controlled Organisations (ACCO) or health cooperatives were involved in design, delivery or evaluation of programs. In relation to health promotion approaches, thirteen (Dinanthompson et al., 2008; Hayhurst et al., 2016; Lee et al., 2008; Macniven et al., 2018; Malseed et al., 2014; Morgan, 2010; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018; Stewart et al., 2014), programs developed personal skills and ten (Dinanthompson et al., 2008; Lee et al., 2008; Macniven et al., 2018; Malseed et al., 2014; Morgan, 2010; Parker et al., 2006; Peralta et al., 2014; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), strengthened community action. Eight programs (Hayhurst et al., 2016; Kickett-Tucker, 2008; Kiran and Knights, 2010; Lonsdale et al., 2011; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016) created supportive environments and one (Skerrett et al., 2018) reorientated health services.

Table 2 shows key study evaluation components. Most studies were explorative in nature, aiming to investigate the impact of programs, as well as stakeholder experiences. Four studies explicitly (Kiran and Knights, 2010; Lee et al., 2008; Malseed et al., 2014; Skerrett et al., 2018), stated in their aims a mental health or SEWB outcome. A total of 2469 participants were involved in the included studies. Sampling sizes ranged from 12 (Hayhurst et al., 2016) – 1296 (Lonsdale et al., 2011) participants. Nine (Dinanthompson et al., 2008; Hayhurst et al., 2016; Kickett-Tucker, 2008; Morgan, 2010; Parker et al., 2006; Peralta et al., 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012) were qualitative and six were mixed method (Lee et al., 2008; Lonsdale et al., 2011; Macniven et al., 2018; Peralta et al., 2014; Skerrett et al., 2018; Stewart et al., 2014). One quantitative non-randomised controlled trial (Malseed et al., 2014) and one quantitative cluster randomised control trial (Kiran and Knights, 2010) was also included. Six studies implemented culturally sensitive research methods and theories, including participatory action research (Hayhurst et al., 2016; Parker et al., 2006; Peralta et al., 2014; Skerrett et al., 2018), cultural interface theory (Peralta et al., 2018; Peralta and Cinelli, 2016), ganma theory (Peralta and Cinelli, 2016), and sharing circles (Hayhurst et al., 2016).

Twelve studies reported a sense of connectedness through predominantly qualitative data. Eleven of these reported a connection to culture (Kickett-Tucker, 2008; Kiran and Knights, 2010; Lee et al., 2008; Lonsdale et al., 2011; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Stewart et al., 2014). One cluster randomised control trial, however did not establish a significant relationship although its' reporting of some data items were unclear (Kiran and Knights, 2010). A connection to community was found in five studies (Macniven et al., 2018; Peralta et al., 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012), and feelings of general social connection in three (Hayhurst et al., 2016; Macniven et al., 2018; Rynne and Rossi, 2012). A connection to family was also reported by one qualitative study (Parker et al., 2006).

Studies identified psychosocial skill development. Nine studies (Dinanthompson et al., 2008; Hayhurst et al., 2016; Lonsdale et al., 2011; Macniven et al., 2018; Malseed et al., 2014; Peralta et al., 2014, 2018; Rynne and Rossi, 2012; Stewart et al., 2014), indicated an increase in confidence, and seven (Hayhurst et al., 2016; Kickett-Tucker, 2008; Morgan, 2010; Peralta et al., 2018; Peralta and Cinelli, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), studies an increase in self-esteem. One quantitative study that investigated self-esteem did not establish a significant relationship. Three studies stated an increase in sense of self (Kickett-Tucker, 2008; Lonsdale et al., 2011; Peralta et al., 2014), and in self-regulation (Dinanthompson et al., 2008; Hayhurst et al., 2016; Skerrett et al., 2018). Three studies (Lonsdale et al., 2011; Malseed et al., 2014; Peralta et al., 2014), reported positive impacts on self-efficacy through quantitative measures; however it should be noted one of these was through the broader measurement of life skills (Peralta et al., 2014). Qualitative data reported a sense of agency in one study (Morgan, 2010). Four studies (Lee et al., 2008; Macniven et al., 2018; Morgan, 2010; Skerrett et al., 2018), determined the effects of programs on resiliency or mental health outcomes. Two studies (Lee et al., 2008; Morgan, 2010), confirmed an increase in resilience whilst a quantitative study did not find any significant changes in cultural resilience (Skerrett

Table 2
Study Evaluation Components.

Publication	Study/report aims	Study participants	Study type and methods	Outcomes of significance	Findings
(Dinanthompson et al., 2008)	Investigate:- The effectiveness of the Kickstart program in enhancing life skills of Indigenous Australians.	Students (N = 38) M (≤16 years) F (≤13 years). Additional stakeholders: Teachers (N = 12) Parents (N = 3) Stakeholders (N = 7).	Qualitative study: focus groups, semi-structured interviews, observation and document analysis.	Confidence and self-regulation.	Social and moral development of students were identified as key outcomes of the program. Interviews and focus groups also revealed increased school attendance and positive behavioural change from the diversionary tactic of sport participation. The data indicates life skills in Indigenous Australians were enhanced, although understanding of the concept varied greatly.
(Hayhurst et al., 2016)	Examine:- How a sport program may reproduce the hegemony of neoliberalism by 'teaching' Indigenous young women education and employment skills to participate in competitive capitalism.	Program participants (N = 9) F. Aged 15–17 years. Additional stakeholders: Staff (N = 3).	Qualitative: field visits, semi-structured in-depth interviews, photovoice and sharing circles.Transnational postcolonial feminist participatory action research.	Confidence, self-esteem,self-regulation and social connection.	The Girls Academy program taught participants self-regulation and health lessons, resulting in enhanced self-esteem and confidence. The young Aboriginal females specifically gained knowledge in the areas of personal hygiene, self-reliance and fundraising, in addition to, developing employability skills.
(Kickett-Tucker, 2008)	Examine: - The interactions of urban Aboriginal children within the context of a sport. Explore:- The sources Aboriginal children use to determine and evaluate their racial identity.	Students (N = 9) M (N = 4) F (N = 5). Aged 11–12 years (Indigenous only). Additional stakeholders: Significant others (N = 20).	Qualitative ethnography: in-depth personal interviews and observation.	Self-esteem, sense of self and connection to culture.	Interactions in sport enabled Aboriginal children to positively express their racial identity by interacting with others in ways that affirmed their Aboriginal identity. Non-Aboriginal peers also contributed positively to Aboriginal student's self-esteem through praise of sport skills and participation. Non-Aboriginal students were also purposeful in their interactions with Aboriginal peers attempting to make friends, accept and respect each other.
(Kiran and Knights, 2010)	Investigate:- The effectiveness of Traditional Indigenous Games program to improve PA and cultural connectedness among primary school students.	Students (N = 167) M (54.2%) F (35.8%). Aged 9–12 years.	Quantitative cluster randomised control trial: baseline and post intervention surveys.	Connection to culture.	Primary schools that delivered Traditional Indigenous Games did not experience any statistically significant improvement in PA levels or cultural connectedness.
(Lee et al., 2008)	Examines:- The role, methods and effectiveness of a community driven youth preventive initiative, in reducing the risk of substance misuse and increasing resilience and connectedness in Aboriginal communities.	Indigenous respondents (N = 30) M (N = 11) F (N = 19). Non-Indigenous respondents (N = 43) M (N = 26) F (N = 17). School age students from Years 1–10 (N = unknown). Additional stakeholders: Community, staff and other stakeholders (N = unknown).	Mixed-method: qualitative; interviews and observation, quantitative; school attendance, youth apprehensions and substance use data.	Connection to culture, resilience and substance misuse.	Interview data revealed increased: youth training, recreational opportunities and communication between local agencies. No quantitative data provided definitive evidence that the unit alone reduced substance misuse or youth apprehensions. Community members however, felt the program had the potential to address these issues whilst increasing resilience and respect for elders and culture.
(Lonsdale et al., 2011)	Evaluate: - The extent to which the Sporting Chance Program has improved education outcomes.	Students (N = 1012) M (48.7%) F (51.3%). Grades 4–12. Additional Stakeholders: Teachers (N = 194) Principals (N = 68) Project providers (N = 22).	Mixed-method: qualitative phone and face to interviews and quantitative; questionnaire, review of education data and site visits.	Confidence, connection to culture, self-esteem, sense of self and self-efficacy.	More than 90% of surveyed and interviewed students reported a positive attitude toward their schooling, particularly in relation to their attitudes to school, self-identity, cultural pride and self-efficacy. Data also revealed a moderate to major increase in school attendance, engagement, retention and

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Table 2 (*continued*)

Publication	Study/report aims	Study participants	Study type and methods	Outcomes of significance	Findings
					parental/community involvement. Some schools reported improved classroom achievement, however, data on this outcome was inconclusive.
(Macniven et al., 2018)	Examine:- The perceptions of the Indigenous Marathon Program in a remote Torres Strait Islander community.	Running Festival participants (N = 104; 42 Indigenous) M F. Aged < 18 years. Additional stakeholders: (N = 18; 14 Indigenous) Program stakeholders (N = 11) Community stakeholders (N = 7).	Mix method: qualitative semi-structured interviews; quantitative questionnaires.	Confidence, connection to community, mental wellbeing and social connection.	Qualitative data identified a range of healthy lifestyle changes occurred as a result of partaking in the 'Indigenous Marathon Program'. These lifestyle changes included improved PA levels, nutrition and mental wellbeing, as well as, enhanced social and community support to be physically active. Nonetheless, quantitative data indicated that Indigenous runners ran for mental wellbeing when compared to non-Indigenous runners ($p = 0.006$).
(Malseed et al., 2014)	Investigate:- The effectiveness of a school-based health promotion program in improving knowledge, attitudes, self-efficacy and behaviours of chronic disease and associated risk factors in young urban Indigenous people.	Intervention group (N = 65) M (67.7%) F (32.3%) Mean age: 14.8 years. Control group (N = 14) M (37.5%) F (62.5%) Mean age: 12.9 years.	Quantitative non-randomised controlled trial: pre and post program questionnaires.	Confidence and self-efficacy.	The intervention group was significantly more confident in preventing chronic disease ($P = 0.005$) and having a health check ($P \leq 0.001$) compared to the control group. This significance, however, did not apply to leadership confidence.
(Morgan, 2010)	Provide:- A description of participating children's and their parents' subjective experience of the program.	Program participants (N = 8) M F. Aged 8-13 years. Additional stakeholders: Parents (N = 7) Staff (N = unknown).	Qualitative: semi-structured interviews, phone interviews and focus groups.	Resilience, sense of agency and self-esteem.	Participants experienced positive effects associated with the challenging activity of learning to surf, finding the program enjoyable and engaging. Identified benefits of the program include increased self-esteem and resilience, feelings of individual and parental pride, as well as opportunities for respite.
(Parker et al., 2006)	Develop, implement and evaluate:- A community-based, multi-strategy health promotion intervention that focuses on children's health.	Students (N = 200) M F. Primary school aged students.	Qualitative: written questionnaires, focus groups and workshops.Community-based participatory action research.	Connection to culture and connection to family.	A process evaluation revealed positive attitudes towards the Our Games, Our Health initiative. Feedback from community members and identified the program as an opportunity to connect with culture, family and peers whilst being physically active.
(Peralta et al., 2014)	Investigate: - The effect of a community and school sport program on Indigenous adolescents' life skills and PA levels within program sessions. Determine:- Program acceptability.	Students (N = 34; 18 data collected on) M (42%) F (58%). Mean age: 13.7 years. Additional stakeholders: School principal (N = 3) CEO (N = 1) Education Manager (N = 1) Programs Manager (N = 1).	Mix method non-randomised pre-post test case study: quantitative 24-item Life Skills Questionnaire and qualitative; focus groups. Community-based participatory research.	Confidence, connection to culture, self efficacy and sense of self.	Although the program was deemed reasonably acceptable and engaged students in moderate to vigorous PA (MVPA score = 58%), there was no change in life skills (e.g., self-efficacy) ($p = 0.93$). Qualitative data, however indicated and painting sessions gave students an opportunity to understand their culture and sense of identity whilst participation in sport developed translated to confidence in the classroom.
(Peralta and Cinelli, 2016)	Investigate:- How the program contributes to the lives of the youth and community members in one remote Aboriginal community.	School students (N = 11)M F. Mean age: 12.3 years. Additional stakeholders: Community members (N = 2) Community Elder (N = 1) School staff (N = 7) Government engagement officers (N = 2) Youth sport	Qualitative: face-to-face semi-structured interviews and focus groups. Ganma approach to evaluation.	Connection to culture, connection to community and self-esteem.	The program was found to positively influence educational and social outcomes of participants through improved school attendance, increased knowledge of recreational activities and feelings of well-

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Table 2 (*continued*)

Publication	Study/report aims	Study participants	Study type and methods	Outcomes of significance	Findings
		and recreation organiser(N = 1).			being and pride. Stronger connections with the broader community and culture were identified as improvements, as well as a greater alignment with curriculum.
(Peralta et al., 2018)	Explore:- The influence that an ACCO and its' sports based mentoring program has on a number of remote Aboriginal communities.	Students (N = 55) M F. School age. Additional stakeholders: Community members (N = 13) School staff (N = 31) Mentors (N = 27).	Qualitative case study: face-to-face semi-structured interviews and artwork. Extended pilot with a participatory research approach informed by cultural interface theory.	Confidence, connection to community, connection to culture and self-esteem.	As a result of participation in the program, mentees improved their self-esteem and confidence. Both mentees and mentors also developed a stronger connection to community and awareness of Aboriginal culture, although they felt this was an area of the program that could be built upon. Increased school attendance and on-task behaviour, as well as, developing key physical and social skills and were also notable outcomes of the program.
(Rynne, 2016)	Explore:- How localised surfing programs contribute to the lives of young people in selected Indigenous communities.Inform:- The evaluation and development of funded surfing programs for Indigenous youths in Australia.	Surfing participants (N = 23) M (70%) F (30%). Aged 15–25 years. Additional stakeholders: Program staff (N = 26) Community members (N = 15).	Qualitative: face-to-face questionnaires, field notes, photographs, video footage, participant observation, document analyses, semi-structured interviews, photo elicitation and focus groups.	Connection to community, connection to culture and social connection.	Through participation in surfing programs, young people developed a range of holistic learning outcomes. The participants were able to build upon and establish a range of community bonds, Indigenous and surf-specific cultural knowledge and connection with land and ocean.
(Rynne and Rossi, 2012)	Investigate:- How surfing programs for Indigenous people function.- The impact of these programs on the social networks of participants and how these may or may not be leveraged for benefit.	Surfing participants (N = 23) M (70%) F (30%). Aged 15–25 years. Additional stakeholders: Program staff (N = 26) Community members (N = 15).	Qualitative explorative study: interviews, face to face questionnaires, field notes, photographs, video footage, participant observation and document analysis.	Confidence, connection to community, connection to culture and self-esteem.	The surfing programs were found to positively influence multiple social determinants, enhancing holistic wellbeing. Program participants, staff and community members established close relationships providing the opportunity for cultural knowledge to be shared and connections formed. Participants also developed numerous psychosocial skills including confidence, self-esteem, empathy, maturity and independence.
(Skerrett et al., 2018)	Describe:- The design and implementation of the group-based intervention.Report on:- Qualitative and quantitative measures that were taken to evaluate the program.	Program participants (N = 75; 61 completed the program; 49 data collected on) M (58.6%) F (41.3%). Aged 11–21 years.	Mix method using pre-post: qualitative focus groups and quantitative; Kessler Psychological Distress Scale and Westerman Aboriginal Symptom Checklist. Community-based participatory research.	Cultural resiliencem, ental disorder/illness symptoms, self-esteem, self-regulation and social and emotional health literacy.	After completing the program, participants experienced a statistically significant decrease in suicidal ideation ($p = 0.008$), in addition to, qualitative accounts of improved understanding of holistic health literacy and increased coping skills. No statistically significant changes in suicide, depression, anxiety, cultural resilience or alcohol and drug usage.
(Stewart et al., 2014)	Examine:- 'Good practice' in four diversion and early interventions for young Aboriginal people in, or at risk of, contact with the criminal justice system.	Students (N = 20) M F. Grades10–12. Additional stakeholders: Parents (N = 2) Teachers (N = 8) Volunteers (N = 3)	Mix method: qualitative semi-structured interviews, observation, document analysis; quantitative attendance, enrolment and achievement data.	Confidence and connection to culture.	Students, teachers and parents reported enhanced knowledge of education and career options alongside improved teamwork and leadership skills. Teachers and parents also reported students gained increased self-confidence, whilst students indicated a connection with cultural content with requests for more in future.

et al., 2018). One study (Skerrett et al., 2018) examined mental-illness related outcomes, identifying significant but not sustained changes in suicidal ideation. Interview data from the 'Indigenous Marathon Program' described the program as an opportunity to enhance mental wellbeing, however, questionnaire data revealed Indigenous runners ran significantly more for mental wellbeing when compared to non-Indigenous runners ($p = 0.006$) (Macniven et al., 2018). Other mental health and SEWB outcomes included social and emotional health literacy (Skerrett et al., 2018) and substance use (Lee et al., 2008; Skerrett et al., 2018). Of the studies that explored substance, one indicated a reduction in substance misuse (Lee et al., 2008) whilst the other did not report a significant change in alcohol or drug consumption (Skerrett et al., 2018). It should be recognised that the study that reported a decrease in longstanding community substance misuse may have been a result of confounding factors (Lee et al., 2008).

3.3. Risk of bias

Table S4 displays quality appraisal results from the Aboriginal and Torres Strait Islander Quality Appraisal Tool. All studies underwent evaluation and their total 'yes' score recorded. The highest score possible was 14. One study (Kickett-Tucker, 2008) received a score of 1, two, (Dinanthompson et al., 2008; Hayhurst et al., 2016) scored 2, three (Kiran and Knights, 2010; Lonsdale et al., 2011; Stewart et al., 2014), scored 3, one (Malseed et al., 2014) scored 4, one (Lee et al., 2008) scored 5, four (Morgan, 2010; Parker et al., 2006; Rynne, 2016; Rynne and Rossi, 2012), scored 6, one (Macniven et al., 2018) scored 9, two, (Peralta et al., 2014; Skerrett et al., 2018)scored 10 and two (Peralta et al., 2018; Peralta and Cinelli, 2016), scored 11.

Table S5 indicates complementary MMAT quality appraisal results. Two mixed-method studies (Lonsdale et al., 2011; Stewart et al., 2014), did not pass screening. Lonsdale et al. (2011) did not pass initial screening as the authors acknowledged the utilisation of inappropriate measurements to determine student school improvement, selecting attendance as a key measure rather non-attendance. Furthermore, data collected during site visits and from surveys during the study was identified as inconclusive. The other study to not pass initial screening was by Stewart et al. (2014). This study did not pass screening as a result of inconsistency of in data collection. Specifically, the authors identified inconsistencies between yearly reporting methodologies and included variables and changes in staff that ultimately made some of the data incompatible for a comparative analysis. Of the studies that passed the screening process, two (Lee et al., 2008; Parker et al., 2006), fulfilled 20% of criteria; one (Peralta et al., 2018) fulfilled 40%; five (Hayhurst et al., 2016; Kiran and Knights, 2010; Malseed et al., 2014; Peralta et al., 2014; Skerrett et al., 2018), fulfilled 60%; two (Macniven et al., 2018; Morgan, 2010), achieved 80% and five achieved 100% (Dinanthompson et al., 2008; Kickett-Tucker, 2008; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012).

4. Discussion

This systematic review provides a summary of available health promotion programs that use sport and PA to achieve mental health and SEWB outcomes. The review revealed most programs operated in major cities or urban areas. Given the increasing number of Aboriginal and Torres Strait Islander people living in these localities, it is encouraging to see that this subset of the population is not underserved in terms of tailored healthcare as they have been in the past (Australian Institute of Health and Welfare, 2015; Mullen et al., 1995). Schools were identified as the most common setting for this type of health promotion activity, due to the high proportion of school-aged program participants and ability to integrate content into the curriculum. Within this setting, and community-based settings, partnerships were formed with local: sports providers, school staff, organisations, and facilities to acquire valuable skill sets, expertise, and access to the target population. Only seven programs (Malseed et al., 2014; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), ran with assistance from ACCOs or cooperatives. Partnerships appeared to be formed for a range of reasons including participant recruitment, accessing cultural expertise and fostering Indigenous governance. The majority of these programs serviced young adults, as well as high school-aged children, suggesting that ACCOs may be suitable partners to target young people and their involvement should be prioritised at the development stage.

The National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing 2017–2023 (Commonwealth of Australia, 2017) emphasises the need for culturally appropriate health services for Aboriginal and Torres Strait Islander people. At the core of the framework is the belief that Aboriginal and Torres Strait Islander people should be active decision-makers in the services that they receive. A range of strategies can be implemented to achieve Indigenous empowerment in health service delivery. The Ottawa Charter (World Health Organisation, 1986) provides an insightful method to conceptualise health promotion strategies and evaluate programs. The majority of the programs in this study developed personal skills of young people. Less prevalent strategies were creating supportive environments and strengthening community action. Of the programs that strengthened community action, five programs (Macniven et al., 2018; Parker et al., 2006; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), built the capacity of community members. The inadequate use of strengthening community action and community capacity building is surprising, given the value Aboriginal and Torres Strait Islander people place on community connections (Dudgeon et al., 2002).

Results from the Aboriginal and Torres Strait Islander Quality Appraisal Tool further verified insufficient community engagement within program and research development. Approximately half of included studies (Lee et al., 2008; Macniven et al., 2018; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), clearly engaged in appropriate community consultation. Nonetheless, it should be acknowledged that some studies were highly successful in engaging local communities and provide valuable examples of best practice when collaborating with Aboriginal and Torres Strait Islander people. Peralta and Cinelli (2016) described high levels of community engagement, particularly indicating the important collaborative role of the local ACCO and Elders in initiating and identifying the program's evaluation and refining the study's research questions, design and interview schedule. Skerrett et al. (2018) also demonstrated a high level of commitment to community engagement when co-designing their program with the local Aboriginal and Torres Strait Islander community. Not only were the local Steering Committee and Elders active co-contributors to research design but a Project Youth Advisory Group was established to approve program content. The research team also endeavoured to integrate community feedback and employed local members from Headspace Inala to collect data as to ensure cultural sensitivity. The above studies provide valuable examples of best practice when engaging and collaborating with Aboriginal and Torres Strait Islander communities for research purposes. As a result of these findings, the authors suggest future mental, SEWB programs place a greater emphasis on community engagement and implement multiple Ottawa Charter action areas inclusive of strengthening community action and capacity building. Program developers should also consider using co-design as it is an established method to empower communities and provides opportunities for self-determination (Dudgeon et al., 2018).

A health promotion framework with an Aboriginal lens by Mungabareena Aboriginal Corporation and Women's Health Goulbourn North East (Mungabareena Aboriginal Corporation and Women's Health Goulburn North East, 2008) highlights the need for thorough project surveillance. Nonetheless, a systematic review of Indigenous Australian health program evaluations found only 10% of programs had been

evaluated (Lokuge et al., 2017). This may be due to a range of challenges associated with undertaking research and evaluation of programs in Indigenous communities such as limited resources (e.g., appropriate staff and funding), inadequate cultural knowledge and securing a project partner trusted by local communities (Hudson, 2017). Furthermore, of the limited published programs evaluations, a large proportion did not use optimal designs (i.e. mixed-method & experimental design). This trend, in particular, is reflected in the study's included programs with six studies stating a mixed-method and two a quantitative experimental design. Despite being an optimal research design, the majority of mixed-method studies used quantitative tools to capture data on school attendance, engagement and retention rather than mental health and SEWB. Furthermore, a third of mixed-method designs (Lonsdale et al., 2011; Stewart et al., 2014), did not pass critical appraisal screening due to incomplete and inconclusive quantitative data. Experimental studies were of moderate quality due to lack of clarity concerning program implementation, participant blinding and complete outcome data (Kiran and Knights, 2010; Malseed et al., 2014). Although qualitative studies were generally higher in quality than mixed-method and experimental, they contained small sampling sizes.

When assessing the cultural rigor of existing literature, the majority of studies were of poor quality with only four studies (Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Skerrett et al., 2018), receiving a score of ten or more. Limited Aboriginal and Torres Strait Islander research leadership and governance were obvious weaknesses of the literature base and are important areas to be addressed in future research. In alignment with National Health and Medical Research Council guidelines, the integration of Aboriginal and Torres Strait Islander research leadership and governance ensures community protocols are followed and enable relevant cultural and contextual knowledge to inform culturally appropriate research design (National Health and Medical Research Council, 2018). Moreover, it is important to note that no studies negotiated agreements in regard to Aboriginal and Torres Strait Islander peoples' rights and access to intellectual and cultural property, suggesting this is an area of research which has been neglected in the past.

Minimal studies in this review used sport or PA to directly target and report on SEWB or mental health outcomes. Instead, studies aimed to evaluate educational and life skills outcomes or stakeholder experiences. This indirectness meant capturing and reporting of data was often vague concerning confounding mental health and SEWB outcomes. A contributing reason to this generalised approach may be the lack of culturally specific data collection tools. Although there are numerous mainstream mental health assessment tools that exist, they do not adequately encompass Aboriginal and Torres Strait Islander people's perspectives on health (Henderson et al., 2007). Only two studies in this review used culturally appropriate mental health and SEWB measurement tools (Kiran and Knights, 2010; Skerrett et al., 2018). Skerrett et al. (2018) utilised the validated youth Westerman Aboriginal Symptom Checklist to measure risk of depression, suicidal behaviours, drug and alcohol use, impulsivity, anxiety and cultural resilience as moderator of risk. Due to the absence of appropriate Indigenous measurement tools previously identified, Kiran and Knights (2010) designed a number of questions to quantify cultural connectedness in the study's student questionnaire. These questions were developed with assistance from an Indigenous Reference Group.

Nine studies (Hayhurst et al., 2016; Malseed et al., 2014; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012; Skerrett et al., 2018), in this review completely or partially utilised an Indigenous research paradigm, acknowledging Aboriginal and Torres Strait Islander ways of knowing, being and doing. Of these studies only six (Hayhurst et al., 2016; Parker et al., 2006; Peralta et al., 2014, 2018; Peralta and Cinelli, 2016; Skerrett et al., 2018), used Indigenous research methods or participatory action research, which is considered an appropriate decolonising methodology (Tuhiwai, 2012). Only one (Hayhurst et al., 2016) study within this review included yarning circles and no studies body mapping despite these research methods having been recommended as appropriate strength-based practice within data collection (Lys, 2018; Smith et al., 2020). Body mapping is an emerging art-based research method, which involves participants tracing a life-sized image of their body and adorning it with different artistic symbols in order to reflect on and express their lived experiences around a topic of research interest (Morton et al., 2021). By evading a reliance on textual materials, body-mapping and yarning circles can be viewed as inclusive research methods which elicit storytelling and accommodate those preferring creative forms of expression which have cultural significance within Aboriginal and Torres Strait Islander communities (Lys, 2018; Smith et al., 2020; Morton et al., 2021).

In line with existing research examining young Aboriginal and Torres Strait Islander people's mental health, the most commonly reported outcomes in this review were general mental health and SEWB indicators (Kilian and Williamson, 2018). Outcomes reported include: connection to culture community or family; general social connection; sense of self; self-regulation; self-efficacy; sense of agency; resiliency, mental wellbeing, mental illness, social and emotional literacy and substance use. The most promising of these outcomes are increased connection to culture and community and enhanced confidence and self-esteem. Multiple moderate to high quality studies found evidence that programs were valuable tools to increase cultural awareness, reinforce racial identity and engage participants in culturally relevant activities (Kickett-Tucker, 2008; Kiran and Knights, 2010; Macniven et al., 2018; Peralta et al., 2014; Peralta and Cinelli, 2016; Rynne, 2016; Rynne and Rossi, 2012). This evidence is consistent with Bruner et al. (2016) review of positive youth development in Aboriginal sport and PA . The results of this study also suggest that programs allow participants to form relationships within their communities and celebrate their identity with peers. Programs that fostered community relationships frequently integrated community stakeholders into design and delivery and these people appear to be essential agents in forming connections. The use of sport and PA programs to enhance self-esteem and confidence in young Aboriginal and Torres Strait Islander people also seems feasible. This was unsurprising given the broader literature supporting a positive link between PA levels, self-esteem and psychosocial health in youth (Eime et al., 2013). Nonetheless, due to methodological limitations, only promising outcomes from the included studies can be identified. Future studies in the area of Aboriginal and Torres Strait Islander young people's mental health promotion should look to use identified outcomes as an initial point of exploration and evaluation.

5. Limitations

Whilst this review was designed according to best practice guidelines; there are limitations to the research process, which should be acknowledged. The broad inclusion criteria allowed for a diverse range of programs to be considered; however, it also created ambiguity in study selection. A small proportion of programs in this review contained eligible participants, in addition to, participants outside of the identified age range. To clarify this issue, reviewers agreed to include studies which contained a discrete overlap of no more than six years with appropriately aged participants. This broad scope in ages is a limitation existing in literature itself, as studies did not report a separate age analysis where appropriate. Several other methodological limitations exist in included studies. Indirectness relating to outcome measurement, suboptimal and culturally inappropriate study designs and a high-moderate risk of bias were the main areas of concern. It is due to these methodological limitations that only pragmatic conclusions on the impact of sport and PA on the mental health and SEWB of young Aboriginal and Torres Strait Islander people can be made.

6. Future directions

Although Aboriginal and Torres Strait Islander health promotion has progressed since its' inception, this has not translated to targeted mental health and SEWB programs for young people. To effectively address this gap, future programs should implement cultural integration and engagement into their design and delivery. The process of cultural integration and engagement can take a variety of forms; however, central to the process is the use of community stakeholders, settings and action. Moreover, the monitoring and review of programs need to be prioritised. In order to improve the quality of the evidence and inform future mental health and SEWB initiatives, longitudinal studies of program outcomes are recommended to capture the magnitude of the effect. Mixed-methods and experimental studies with culturally appropriate methodologies are also advised to strengthen the available evidence. A more extensive literature base with comprehensive evaluations would allow best practice to be identified, disseminated and replicated.

7. Conclusion

This is the first systematic review to critically appraise available literature on sport and PA programs and their impact on the mental health and SEWB outcomes of young Aboriginal and Torres Strait Islander people. Even though there were promising positive impacts on confidence, self-esteem and a connection to culture identified by this review, at present, only pragmatic conclusions can be drawn. Future research needs to quantifiably investigate the effect of sport and PA through culturally sensitive methodologies and tools before a more a definitive conclusion can be made.

8. Statement of ethical compliance

This systematic review was based on publicly available anonymised data, and thus exempt from ethical compliance.

Author contributions

ME, JE, LW, and CC led the study conception and design. ME and SD conducted the literature search, extracted relevant data and performed critical appraisals of all included literature. ME, LW, JE and CC critically revised and reviewed the manuscript. All authors commented on the full draft and approved the final manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2021.101676.

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