## Appendix E – Literature review

## Prevalence of physical activity

Physical activity is generally viewed as a headline indicator of general population health in epidemiological research. Analysis by Australian Institute of Health and Welfare (AIHW) (2017) found that insufficient physical activity contributed to 2.6% of the total burden of disease in 2011 and when combined with overweight and obesity, the total burden of disease increased to 9%. As this is equal to the estimated burden of disease from smoking, a lack of physical activity may be considered a key risk factor for the total burden of disease nationally.

Many studies highlight that Australian children are not participating in sufficient physical activity. The Queensland Preventative Health Survey (Queensland Health, 2018) showed that only 41% of Queensland children 5–17 years were undertaking sufficient physical activity (based on parent/carer report) and 26% were either overweight or obese. Results by gender also highlighted that, 45% of boys and 36% of girls were doing sufficient physical activity (active 60 minutes or more daily over the past week) and 27% of boys and 25% of girls were overweight/obese.

The NSW Schools Physical Activity and Nutrition Survey (Hardy et al, 2016) was designed to measure the prevalence of physical activity in children 5–16 years. Based on a population survey of 7,556 children in years K, 2, 4, 6, 8 and 10, the survey found that only 19% of children 5–16 years met the daily physical activity recommendation of 60 minutes of exercise per day. Girls (15%) were less likely to meet physical activity recommendations, compared to boys (24%). In addition, children and adolescents from urban areas (18%) were less likely to meet the physical activity recommendations than children in rural areas (22%).

Tests of children's fitness similarly highlighted that only 65% met cardiorespiratory standards (a 20m shuttle run test) and only 36% met standards for muscular fitness (a standing broad jump test).

The Victorian Child Health and Wellbeing Survey (Department of Education and Training, 2016) identified similar trends. In Victoria, only 59% of children aged 5 to 12 years were doing physical activity for at least 60 minutes each day and girls (57%) were less likely to meet physical activity guidelines than boys (67%). Inactivity was also measured in this survey by examining time spent on screens. A total of 18% of children aged 5 to 12 years exceeded the recommended daily maximum screen time.

The Victorian Students Health & Wellbeing Survey (Department of Education and Training, 2016) gathered self– reported measures of physical activity in 12,165 students in years 5, 8 and 11 across 306 Victorian schools. Results showed that around one in four students (23%) met National Physical Activity guidelines (60 minutes of physical activity each day) and around two in three students (68%) exceeded the recommended maximum of two hours of sedentary activity per day.

The 2018 Report Card on Physical Activity for Children and Young People (Active Health Kids Australia, 2018) summarised the overall national trend. Using data from physical activity studies across different states/territories, the report card calculated that an estimated 6% of children 15–17 years and 18% of 12–17 year olds receive at least 60 minutes of daily Moderate to Vigorous Physical Activity (MVPA) (based on self–report data) and only 13% of children 15–17 engage in muscle and bone strengthening exercise at least three days per week. In addition, concerning trends for sedentary activity were identified. The majority of Australian children and young people were reported to be engaging in more screen time than recommended by national guidelines, with no change observed from 2016.

It was noted that limits for sedentary screen time were exceeded and this was particularly true for adolescent boys and adolescents generally aged 12–17. In particular, results showed that screen time guidelines were met by only 27% of children 3–5 years, by 35–46% of children 5–12 years and 14% of children 12–17 years.

Low participation in muscular strength and bone strengthening activity has also been noted. In particular, research by the AIHW (2018) reported that, in 2014 to 15, 63% of 15–17 year olds completed no strength–based activities, with only 1.5% undertaking the recommended amount of both physical and strength–based exercise (i.e., 60 minutes of physical activity per day and 3 days per week or strength based activity).

Together, Queensland and Australian studies highlight that physical activity in young children is generally inadequate and that many children also exceed the recommended hours of sedentary activity each day. Such research generally illustrates the value of looking at children's participation in physical activities, along with time spent in more sedentary activity.

### Changes in physical activity over time and across the life course

While the prevalence of physical activity in children is low, grounds for further concern also come from data suggesting that the prevalence of children's fitness is in decline. In the NSW Schools Physical Activity and Nutrition Survey (Hardy et al, 2016), the proportion of children meeting standards for cardiorespiratory fitness declined in 2015 in a number of sub–populations. Most notably, the decline was observed in children of high SES backgrounds and in children of Asian backgrounds and in children from urban areas.

The Health of Queenslanders Report highlighted that the proportion of children aged 5–17 years who were active every day (a protected factor for disease) was relatively static between 2011 and 2018, with 41% of children undertaking sufficient physical activity (Queensland Health, 2018).

The Victorian Child Health and Wellbeing Survey (2013), however, showed different trends. Compared to 2009, results in 2013 highlighted that physical activity had marginally increased (up 1.9%) for children 5–12 years (based on children who were active for at least 60 minutes each day).

Given evidence that physical activity of Queensland children may be declining, there is value in exploring when specific changes in physical activity tend to occur. One of the most recent national reviews considered physical activity across the life course of children (AIHW, 2018). Results of this review highlighted that around 30% of children aged 2–17 years met physical activity guidelines and the tendency to meet guidelines decreased with increasing age for both children and adults. It decreased from 61% in children 2–5 years to 26% in children 5–12 years and to only 7.9% of children 13–17 years.

The UK–based Gateshead Millennium Study also highlights a sharp decline in physical activity in children as they age (Farooq et al, 2018). One of very few longitudinal cohort studies globally, the study has tracked the physical activity of children at ages 7, 9, 12 and 15 years for a period of eight years. Early study results highlight a sharp decline in physical activity around age 7. Four trajectories of change in total volume of physical activity were identified and all trajectories declined from age 7. While a UK study (rather than an Australian study), this study highlights that the activity decline may occur *well before* adolescence and found no clear evidence that declines during adolescence were any greater than those occurring during childhood.

The only US longitudinal study to measure physical activity across childhood and adolescence found a similar trend. Physical activity declined in both boys and girls from age 5 in most study participants (Kwon et al, 2015). Farooq et al (2018) used such evidence to emphasise the need for greater early programs to arrest the age– related decline in physical activity well before adolescence. It was similarly suggested that the focus on 'high risk groups' – such as adolescent girls – was unwarranted as the entire paediatric population was at risk for low and declining physical activity.

Possibly the only more recent study investigating physical activity changes in children was conducted in the US (Varma et al, 2017). The study used accelerometer data from the 2003–2006 National Health and Nutrition Examination Survey to examine physical activity changes across the lifespan. While the reasons for the finding were not known (although attributed to possible differences in diurnal patterns of physical activity by age), study results highlighted that from ages 6 to 19, physical activity declines in part due to later initiation of morning physical activity. Also surprising was that total activity levels at age 19 were consistent with adults at age 60.

Findings were used to emphasise a need to re–evaluate how emerging adulthood may affect physical activity levels in children and a need to consider the importance of time of day when developing physical activity interventions. Authors similarly highlighted that it may be relatively more important to focus on increasing lower intensity physical activity and reducing inactivity, rather than necessarily focusing on high intensity activity.

### Barriers to physical activity participation

While there is still a need for much more research into the determinants of declines in children's physical activity, research has examined the barriers to children participating in physical activity. Hesketh et al (2017) recently conducted a systematic analysis of barriers in literature relating to children 0 to 6 years, which may be indicative of general barriers for children beyond the age group. Forty three papers were included in the systematic review.

Results showed that the key barriers to physical activity or facilitators of sedentary behaviour related to the child, the home, out-of-home childcare, parent–childcare provider interactions, environmental factors, safety and the weather. When each theme was mapped onto different levels of a socio-ecological model, the most common themes related to barriers and facilitators at an *interpersonal level* (e.g., parents, care providers and family), highlighting that barriers for adults play a key role in determining children's physical activity.

Examples of barriers and facilitators were also provided for each of the seven themes, although the authors noted that the difference between barriers and facilitators was <u>rarely distinguished</u> by parents (This was also why barriers and facilitators need to be considered <u>together</u>). They included individual child preferences for sedentary behaviour, parent/carer belief's that children must have down time, parent/carer beliefs in the value of structured activity for child development, children being obese, parents being physically active themselves, parents instilling the value of physical activity in children, parent/carer jobs and associated time commitments, having siblings or friends that do physical activity and having available space at home.

Child care providers also highlighted that they may inadvertently discourage activity due to an emphasis on cognitive development in early childhood education and that available space was also often a barrier. In some cases, providers also saw parent/carer worry about children playing outside (e.g., due to cold weather) as a further barrier. The general environment emerged as a further theme. Parents were reported to be concerned about the health and safety of children using playground equipment (e.g., due to drug users), along with the safety of children playing in inclement weather (though nice weather was considered a facilitator). Accordingly, such themes highlight the many reasons why some children do not undertake sufficient physical activity.

The AusPlay survey additionally explored barriers to physical activity (ASC, 2017). In the AusPlay study (ASC, 2017), the three most commonly reported participation barriers related to children being the wrong age (e.g., too young) (73%), the child already doing enough physical activity (4.6%) and not enough time or 'too many' other commitments (4.0%).

Trends for children by age also produced similar themes. Children 5–12 reported the top three barriers as Wrong age (17%), Not enough time or too many commitments (9.8%) and Can't afford it/can't afford transport (8.3%). Children 13–14 reported the top three barriers as Don't like physical activity or not interested in sport (29%), Not a priority (22%) and Not enough time or too many commitments (10%). In comparison, children 15–17 years reported the top three barriers as Don't like physical activity or not interested in sport (30%), Not enough time or too many commitments (12%).

### Key insights

- Physical activity is a key indicator of population health and lack of physical activity contributes to the burden of disease in both adults and children.
- Queensland children are generally not undertaking recommended physical activity (60min /day) and are exceeding maximum daily recommendations for screen time (2hrs/day).
- Muscular strength is particularly poor in children and just over one third of children are likely to meet muscular strength standards (and just under two thirds meet standards for cardiorespiratory fitness).
- The tendency for children to meet physical activity guidelines generally decreases with increasing age – a sharp decline has also been noted in physical activity around age 7 and contrary to popular thought, this occurs well before adolescence.
- Some research suggests that, from ages 6 to 19, physical activity may decline in part due to later initiation of morning physical activity.
- Provide the approximation of the approximation o
- Some studies highlight the need for a greater focus on encouraging low intensity physical activity and reducing inactivity, rather than only increasing high intensity activity (e.g., sport).
- Common barriers to children participating in physical activity relate to both children and parent-based factors – Parent-based factors also rank in the top three barriers (i.e., perceptions that children are too young, are doing enough physical activity and that there is not enough time).

### Active play in young children

Given that both parent/carer and child related barriers impact children's participation in organised sport, research has explored children's participation in less formal physical activities. Active Play, in particular, has been found to be associated with a high proportion of children's overall physical activity. In particular, a study of 747 children aged 10 to 11 years in the UK (Brockman et al, 2010) found that Active play five days per week was strongly associated with mean daily activity levels. In addition, more frequent Active Play was associated with a higher intensity of physical activity weekdays after school for both boys and girls. Interestingly, however, frequent Active play was only associated with higher mean activity levels on weekends for boys.

Accordingly, increasing Active play after school was highlighted as a priority and also described as a means of children reaching required daily physical activity levels. It was also concluded that 'Active play makes a significant contribution to health–enhancing physical activity of many primary school–aged children and therefore may be a valuable focus for future interventions' (p147).

Recent data on children's Active Play or free time physical activity is also available from a Queensland study of 2296 children by Clemens and Lincoln (2018). Using a parent/carer report methodology in a telephone survey, study findings showed that the largest percentage of children's physical activity came from activities completed in the school environment (33%) and in the child's free time (42%). Moderate participation levels were also associated with Active Transport and organised sport, however, these only contributed a much smaller proportion to total physical activity levels (10% and 15%, respectively). Having a parent/carer with high activity was also associated with higher activity levels.

Overall, 91% of children participated in physical activity in their free time, compared to 65% in Active Transport, 66% for club sport and 98% in school. Results for activity in free time were also analysed by age. For children 5–7 years, 53.2% of their total physical activity was in free time. In comparison, for children 12–15 years and adolescents 16–17 years, school was the predominant source for respectively 36% and 37% of their total activity.

Together, results highlight that physical activity through means other than sport – including through Active play and general free time physical activity – has potential to contribute to a significant proportion of children's total physical activity. Tremblay et al (2014) also notes that it Active play is a domain of physical activity that has received relatively scant attention in research literature and only five out of fifteen countries producing a physical activity report card for children have included Active play as an indicator.

### **Active Transport**

Non Exercise Activity Thermogenesis (NEAT) (which is the energy expended during day-to-day physical activity that is not exercise) is important in promoting energy expenditure (Levine, 2002). While Active Play contributes to children's general energy expenditure, Active transport to and from school also presents a further opportunity for energy expenditure and physical activity by children. In spite of many children being able to walk, ride or scooter to school, Active Healthy Kids Australia (2015) reports that only half of Australia's children and young people use Active transport at least once per week to travel to and/or from school.

Based on its review of studies nationally, Active Healthy Kids Australia (2015) found that parents of children 5-6 years and 9-10 years reported that respectively 45% and 47% undertook active travel at least once per week, compared to 59% of secondary students aged 12-17 years. Current participation also equates to around 18 minutes per day on average of Active transport for children 5–17 years and this generally increases with age (i.e., Children 5–8 spend 13 min/day, children 9–11 years spend 18 min/day, children 12–14 years spend 20 min/day and children 15–17 spend 24 min/day).

Nicholson et al (2014) also summarised state–based survey data to show that the proportion of children travelling to school independently peaks at age 13 (approximately 50% of children), with only 36% of all children 9–15 years travelling to school without an adult. Boys were also found to be more likely to travel to school independently (39%) than girls (33%).

Given the difficulty that children have in meeting daily physical activity requirements, there is great potential to increase Active transport by children. However, a decline in Active Transport has occurred worldwide and a range of barriers need to be addressed to achieve this goal. In particular, while around 90% of Australian households have at least one child's bike in working order (Cycling Promotion Fund, 2012), only 11% ride to and from school.

Just under one half of parents also state that the main reasons why they did not allow their child to ride to or from school related to concerns about 'stranger danger' or concerns about the dangers of road traffic and other road users. Other research similarly suggests that distance is a barrier, with 2km being the 'tipping point' associated with a sharp decline in active trips to and/or from school each week Australian Institute of Family Studies (2019). However, given the potential for Active Transport to contribute to children's total physical activity, there is potential to explore opportunities to increase this where possible.

### Key insights

- Q Active Play is strongly associated with overall average activity levels of children.
- Provide the second s
- Most sport and recreation studies have not measured Active play in children's physical activity report cards and this is highlighted as a future priority.
- Only half of Australia's children and young people use Active transport at least once per week to travel to and/or from school.
- Barriers to Active transport include parent/carer fears of strangers and dangers from road traffic and other road users.

# Children's participation in exercise, sport or recreational activities for physical activity

### Children's sport, exercise and recreational activity participation

While Active play and Active transport each have potential to contribute to children achieving minimum required levels of daily physical activity, most studies to date have primarily focused on children's participation in sport and recreation activities (With Active play and Active transport often considered 'out of scope'). The largest and most significant national study, AusPlay, is a national rolling telephone survey of both adult and children's physical activity across Australia (Australian Sports Commission, 2017). While the study considers children aged between 15 and 17 years as 'adults', parent/carer report is also obtained for younger children.

Results for Queensland children 15–17 years during 2017–2018 highlighted that 91.4% of children participated in sport or physical activity and this result was 94% for boys and 88.6% for girls. Once per week participation was 86.2% for children 15–17 years and 87.5% for boys and 84.9% for girls. The proportion of children 15–17 years taking part three or more times each week, however, was lower at 75.7% overall and 75% for boys and 76.5% for girls.

Once per year participation rates for young Queensland children are also available. Findings showed that overall participation was 43.3% for children 0–4 years, 82.4% for children 5–8 years, 85.7% for children 9–11 years and 84.3% for children 12–14 years. Trends by gender similarly showed that participation for boys 0–4 years was 41.6%, compared to 44.3% for girls, participation was 83.8% for boys 5–8 years, compared to 80.6% for girls, participation for boys 9–11 years was 87.4%, compared to 84.3% for girls and participation for boys 12–14 years was 84.6% compared to 83.9% for girls.

While detailed trends by age were not available, overall participation for specific activities was reported for Queensland children 0–14 years. All results are from July 2017 to June 2018 and as seasonal differences prevail, results cannot be compared to other survey periods. Results overall showed that the top participation activities for Queensland children 0–14 were Swimming (29.1%), Football/soccer (13.0%), Dancing (recreational) (9.3%), Gymnastics (8.9%), Tennis (5.9%), Touch football (5.4%), Netball (4.8%), Cricket (4.5%), Athletics, track and field (includes jogging and running) (4.3%) and Rugby league (4.3%).

Top activities for boys 0–14 years were Swimming (29.9%), Football/soccer (20.0%), Rugby league (8.5%), Tennis (7.8%), Touch football (7.5%), Cricket (7.3%), Gymnastics (6.8%), Athletics, track and field (includes jogging and running) (5.5%) and Dancing (recreational) (2.0%). In comparison top activities for girls 0–14 years were Swimming (28.5%), Dancing (recreational) (16.1%), Gymnastics (10.9%), Netball (9.3%), Football/soccer (6.5%), Tennis (4.1%), Touch football (3.4%), Athletics, track and field (includes jogging and running) (3.2%), Cricket (1.9%) and Rugby league (0.4%). All differences by gender – with the exception of swimming – were also statistically significant differences.

The AusPlay study examining children's participation in organised physical activity outside school hours also provides national trends on children's organised activity participation. Organised implies that the activity is formally arranged by a club, association, school or other type of organisation. National trends showed a four percentage point increase in children's participation in such activities from 2016 (70%) to 2017 (74%).

Results similarly showed that the proportion of children participating at least once per week had increased during the same period from 56% in 2016 to 63% in 2017, a did the proportion participating at least three times each week (This was 20% in 2016 and 25% in 2017). Compared to girls, for boys, sports accounted for a greater proportion of organised activities outside school hours, while the reverse applied to girls (where non–sport related activities accounted for a far greater proportion of activity).

Age was also attributed as a key determinant of the decline in physical activity. Results by gender similarly highlighted no differences in participation rates between 12–14 year old boys and girls in 2016 and 2017, however, a significant difference emerged for 12–14 year old boys and girls in the same period (87% for boys and 81% for girls). Analysis also revealed that almost half of all girls (compared to less than one quarter of boys) reported a dislike of physical activity as a reason for non–participation.

Dislike of physical activity was also a common reason for non-participation across older age groups, while for younger children the main barrier to participation related to the perception that a child was too young to participate in organised sport or physical activity outside school hours.

### Key insights

Results from Ausplay 2017–2018 highlight the following Queensland trends:		
0	91.4% of Australian children participated in sport or physical activity and this result was 94% for boys and 88.6% for girls.	
0	43.3% of Australian children 0–4 years, 82.4% of children 5–8 years, 85.7% of children 9–11 years and 84.3% of children 12–14 years participated in sport or physical activity.	
Q	Sport and physical activity participation for boys 0–4 years was 41.6%, compared to 44.3% for girls, participation was 83.8% for boys 5–8 years, compared to 80.6% for girls, participation for boys 9–11 years was 87.4%, compared to 84.3% for girls and participation for boys 12–14 years was 84.6% compared to 83.9% for girls.	
0	Top participation activities for Queensland children 0–14 were Swimming (29.1%), Football/soccer (13.0%), Dancing (recreational) (9.3%), Gymnastics (8.9%), Tennis (5.9%), Touch football (5.4%), Netball (4.8%), Cricket (4.5%), Athletics, track and field (includes jogging and running) (4.3%) and Rugby league (4.3%).	
0	National Ausplay trends for children also highlight that:	
	0	There was a four–percentage point increase in children's participation in such activities from 2016 (70%) to 2017 (74%) (0–14 years)
	0	The proportion of children participating at least once per week increased during the same period from 56% in 2016 to 63% in 2017
	0	Compared to girls, for boys, sports accounted for a greater proportion of organised activities outside school hours, while the reverse applied to girls (where non–sport related activities accounted for a far greater proportion of activity)
	0	There are no differences in participation rates between 12–14 year old boys and girls in 2016 and 2017
	0	However, a significant difference emerged for 12–14 year old boys and girls (87% for boys and 81% for girls)
0	Almost half of all girls (compared to less than one quarter of boys) reported a dislike of physical activity as a reason for non–participation.	

## Developing physical literacy in children

Early exposure of children to physical activity has been found to be associated with a range of positive benefits. Sallis et al (2000), in particular, found that exposure of children to physical activity was positively correlated with the likelihood of maintaining an active lifestyle during both adolescence and adulthood.

While there is still much to be learned about the factors that determine whether a child will continue to be physically active into adulthood, the concept of 'Physical Literacy' is being explored as a potential construct that may help predict such future behaviour.

It has been proposed that physical literacy influences important health outcomes, such as cardiovascular fitness, strength, motor skills, and obesity status (Gately, 2010), and it is associated with a wide array of behavioural, psychological, social, and physical variables (Edwards et al, 2017).

While there is much interest in Physical Literacy, there is still debate over its characteristics. According to Canada's Physical Literacy Consensus Statement, Physical Literacy is the 'motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life' (Physical Literacy Canada, 2015). Tremblay and Lloyd (2010) advocated the need for more robust measurement of physical literacy at a population level, as undertaken for other related areas of knowledge such as literacy and numeracy.

Through a peer reviewed paper in 2010, the authors proposed that:

Physical literacy is a construct which captures the essence of what a quality physical education or a quality community sport / activity program aims to achieve. It is the foundation of characteristics, attributes, behaviours, awareness, knowledge and understanding related to healthy active living and the promotion of physical recreation opportunities.

(Tremblay and Lloyd, 2010)

Four inter-related domains of knowledge were proposed to be included in physical literacy:

- Physical fitness (cardiorespiratory, muscular strength and flexibility)
- Ø Motor behaviour (fundamental motor skill proficiency)
- Physical activity behaviours (directly measured daily activity)
- Psycho–social/cognitive factors (attitudes, knowledge and feelings)

The authors proposed a link between fundamental motor skills and physical activity and proposed that physical activity and motor skills have also been found to be linked to physical fitness (e.g., Fisher et al 2005, Boreham & Riddoch, 2001; Barnett et al, 2008). Physical literacy is thus conceived as being an outcome associated with integration of these four key domains and is a prerequisite for lifelong physical activity.

Canada's response to physical literacy has been to develop a testing protocol to measure physical literacy in children (refer <u>www.capl-ecsfp.ca</u>) (Physical Literacy Canada, 2015). A unique aspect of the Canadian approach is that Physical Literacy is conceived much more broadly than just fitness and motor skill. Developed through assessment of more than 2,000 children (including input from over 100 experts), the approach assesses multiple aspects of physical literacy including daily behaviour, motivation and confidence, knowledge and understanding and physical competence.

Also unique, the screening is proposed to take less than 5 minutes and can help identify children that are struggling with physical literacy. Reference norms also indicate that around 90% of children will be assessed to have good physical literacy and between 67–80% will be assessed as being below the standard (and require support or intervention). The testing protocol for physical literacy assessment involves children being asked a screening question to determine their need for further screening (Compared to other kids your age, how active are you? (circle one number) (1 – A lot less active, 5 to 6 – Same, 8 to 10 – A lot more active).

Children scoring less than 5 are directed to take part in a running exercise where the child runs forward and backwards to a marker 5m away. Ratings are provided of the child's performance during the running task. For instance, a rating of 1 is provided where the child stumbles, trips or slips, while a rating of 4 is where the child moves purposefully around the marker. If space is not available to conduct the test, parent/carer support questions are available. Questions are based on an assessment of parent/carer support for physical activity by Garcia et al (1995) and include two questions – *During a normal week, how often do your parents take you to play games or sports?* (Never, Not Often, Sometimes, Often, Very Often) and *During a normal week, how often do your parents play active games or sport with you?* (Never, Not Often, Sometimes, Often, Very Often).

If a child answers either question as 'Often' or 'Very Often', a more in–depth physical literacy assessment is not required. If both questions have this response, the screening continues to a wall sit test, as designed by Truter, Pienaar, & Du Toit (2010). If a participant scores less than 20 seconds on the wall sit, a detailed assessment of the child's physical literacy (e.g., Canadian Assessment for Physical Literacy) is recommended. If the child scores 20 seconds or longer, a more in–depth assessment of physical literacy is probably not required.

The full assessment then has a range of tests to assess the child's physical literacy in great detail. This highlights that the focus of the Canadian approach is on screening children likely to have a <u>deficit</u> in physical literacy and then on more in–depth assessment of the nature of deficits of children who fall below the standard.

Whitehead (2010) was amongst the first author to conceptualise the concept of physical literacy as more broadly than just physical performance. Whitehead (2010) conceptualised physical literacy as – The motivation, confidence, physical competence, knowledge and understanding to maintain physical activity throughout the life course (Whitehead, 2010; p11).

While different studies have examined physical literacy from different perspectives, Edwards et al (2018) systematic review of the domain found that only 3% of studies examining the topic had conceived physical literacy in terms of a mix of cognitive, affective and physical aspects. In comparison, 61% of papers had examined only physical aspects, 22% had examined affective aspects and 14% had examined cognitive aspects.

The author then concluded that future research should examine constructs beyond physical performance and explore physical literacy from a more holistic perspective. Psychological aspects of being able to confidently be involved in physical activity are also arguably important.

Recent developments by the Australian Sports Commission also reflect this theme. In particular, the Australian Physical Literacy Framework (2019) covers the physical, psychological, social and cognitive domain of standards for promoting physical literacy in children (Refer Table 101) (Australian Sports Commission, 2019).

It is also proposed that the four domains are interrelated and only together, develop children's physical literacy. The initiative by states such as NSW to measure children's fundamental movement skills also highlight a growing interest in this domain.

#### Table 101. The Draft Australian Physical Literacy Standard (ASC, 2019)

Physical domain

The physical domain is about being able to:

- Perform movement skills (including Fundamental Movement Skills) that involve controlling and adapting posture and balance, to successfully negotiate different environments
- Apply the movement strategies that a situation or environment requires
- Manipulate and control different objects across a variety of movements and physical activities
- Build to a level of fitness to successfully participate in a range of physical activities

Psychological domain

The psychological domain is about being able to:

- Identify and draw satisfaction, self-esteem, confidence, motivation and enjoyment from different movement experiences
- Understand, demonstrate and manage emotional responses, such as empathy and sensitivity, during movement and physical activities
- Output of the second second
- Persist with movement regardless of difficulty, challenges or failure, in the belief that improvement will come with learning and effort.

Social domain

The **social domain** is about being able to:

- e Build and maintain respectful relationships that enable a person to interact effectively with others
- Lead others in collaborative, ethical and inclusive behaviours in physical activity, including understanding when to be a team member or a leader
- Oevelop a sense of understanding and openness when participating in physical activities, which can include a willingness to share and learn from experiences from your own and other cultures
- Exhibit fair play and ethical behaviour in a variety of physical activities and environments.

Cognitive domain

The cognitive domain is about being able to:

- Think, understand and make decisions, knowing how and when to perform movement skills
- Q Understand, follow and anticipate rules and apply tactics or strategies within a game
- Know ways of moving with and around other people and the environment to solve movement challenges
- Know and understand the short and long-term benefits of participating in movement and physical activity.

### Key insights

- Provide a link between early physical activity participation by children and maintaining an active lifestyle during adolescence and adulthood.
- Some jurisdictions are beginning to measure physical literacy in children (e.g., Canada). Screening tests focus on identifying deficits for early intervention.
- While most research has focused on physical aspects of physical literacy, it is now accepted that physical literacy may also have cognitive and affective components.
- Provide the Australian Physical Literacy Framework (2019) is the first national attempt to recognise the multidimensional nature of physical literacy. This covers not only the physical domain, but also the psychological, social and cognitive domain.
- While determinants of physical literacy are unknown, early exposure of children to diverse sport, exercise and recreation opportunities may support physical literacy and lifelong physical activity.

## Conclusions and context for the current study

While considerable research is still needed to understand the link between children's participation in physical activity and lifelong physical literacy, it is conceivable that higher life time participation in a diverse range of activities up to age 18 may support the potential for lifelong physical literacy. Within this context, the current study aims to investigate Queensland children's physical activity participation in sport, exercise and recreation activities outside school hours.

To ensure a broad definition of physical activity, this study adopts a unique new measurement approach to examining activities of Queensland children. Unlike previous national studies, parents are prompted to think of any activities that their child may have participated in over the past 12 months and unlimited activities were captured. Parents were also prompted to include minor activities and consider not only sporting activities, but also exercise and recreation activities. This reflects the growing recognition that movement based physical activity, rather than just playing sports has potential to improve the health and wellbeing of children.

In addition, major clusters of different activities were prompted to trigger parent/carer recall of their child's participation in activities and a detailed coding frame was developed to record activities. In particular, activities like bike riding were coded to different locations and types of riding (e.g., BMX at skate parks, Footpath riding, track and velodrome cycling).

With over 200 pre–codes developed, this permitted a very detailed assessment of activities undertaken by Queensland children outside school hours during the past 12 months. Comprehensive detail on the study methodology and measurement approach is also provided in the methodology section.