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Rationalizing teacher roles in developing and assessing physical literacy in children

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Abstract

Physical literacy serves as the foundation for several skills or attributes needed for lifelong physical activity participation. Based on its connection to physical activity, physical literacy has been associated with a wide variety of positive health outcomes. While research suggests that teachers play a crucial role in fostering children's physical literacy, however, few psychometrically sound measures have been designed for teachers to assess physical literacy in children. A teacher proxy-report instrument that assesses the four physical literacy domains (i.e. physical, psychological, social, and cognitive), along with the comprehensive set of 30 elements proposed by the Australian Physical Literacy Framework,

could provide a useful metric for teachers to assess children's physical literacy levels. Accordingly, this paper provides a rationale for developing such a tool for physical literacy assessment, focusing on children aged 5-12 years, using Sport Australia's definition and framework for physical literacy.

Keywords: Physical literacy; Physical activity; Assessment; Teacher proxy-report

Setting the scene: Understanding the term “literacy”

Understanding and interpretation of the term “literacy” has evolved since the mid-twentieth century (Fransman 2005). Several countries have contested its definition, meaning, and translation based on their respective epistemological beliefs, political, and socio-cultural experiences with literacy (Fransman 2005; Street 2006). In the academic world, literacy was previously viewed as a process of acquiring the basic cognitive skills necessary to read and write in text and perform simple arithmetic, while maintaining a broader understanding of communication (UNESCO 2004). This has now expanded to include more complex views, which entail using these skills to contribute effectively to socio-economic development and building relationships in the wider society (UNESCO 2004; UNESCO 2006). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) continues to push for global literacy and identifies literacy as a fundamental right of every individual (UNESCO 2019).

Moving on to physical literacy

Many literacy-related fields have since emerged, including information literacy, digital literacy (Fransman 2005), political literacy, and health literacy (Pot et al. 2018). In Health and Physical Education (HPE), sports, recreation, and public health spheres, the idea of physical literacy has become increasingly popular among educators, practitioners, and policymakers (Lundvall 2015; Pot et al. 2018). Stakeholders (including researchers and educational administrators) advocate that while proficiency in

verbal or mathematical literacy is important to every child's educational development, physical literacy should be regarded just as highly (Delaney et al. 2008; Edwards et al. 2018; Tremblay 2012) and should be considered an indispensable component in any quality educational framework (Roetert and Jefferies 2014; Tremblay 2012).

In the Quality Physical Education Guidelines for Policymakers developed by UNESCO (2015), quality physical education is recognized as an integral part of school curricula, which should provide a context for developing physical literacy in school-aged children. There is ongoing interest in this concept, with many countries establishing initiatives designed to promote physical literacy in different populations (Spengler and Cohen 2015). In Australia, although "health literacy" was favoured over physical literacy in the official HPE curriculum (Australian Curriculum, Assessment, and Reporting Authority 2016), the recently launched Australian National Sport Plan sees physical literacy as a vehicle through which physical activity and sports participation can be enhanced amongst Australian children (Sport Australia 2018). The concept is also entrenched in other national Physical Education (PE) curricular documents, including those in the United States, England, and Wales (Spengler and Cohen 2015).

The concept of physical literacy is far from new. A recently published narrative of its origins highlights that physical literacy dates as far back as the 1880s, when Captain Edward Maquire of the United States Army Corps of Engineers used the term to describe the movement quality of an indigenous culture. However, past descriptions of the construct did not regard physical activity engagement as the ultimate goal of becoming physically literate (Cairney et al. 2019b). Whitehead (2010), after studying the role that the embodied dimension plays in our existence, argued against dualistic views of the human condition. Drawing from philosophical schools of thought (including existentialism, monism, and phenomenology), she reconceptualized physical literacy as a holistic concept, centred on each individual's embodied interaction with the world through movement and physical activity. More recently, she described physical literacy as the "motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engaging in physical activities for life" (Whitehead 2019, p. 8). However, although physical literacy has received significant attention since its reintroduction, this increased popularity has resulted in many diverse

definitions for the concept (Jurbala 2015). Currently, there is no international consensus on the definition and operationalization of physical literacy (Belton et al. 2019), though many countries and organizations agree that it's an important avenue for promoting lifelong physical activity (Splenger and Cohen 2015; Tremblay et al. 2018).

Physical literacy: Importance and limitations of current research

There is growing evidence to support the importance of physical literacy. Physical literacy is considered a multi-faceted construct (Cairney et al. 2019a) with hypothesized associations with many physical, psychological, social, and cognitive health variables (Edwards et al. 2018). Indeed, in a recent publication, Cairney and colleagues provided a comprehensive, evidence-based conceptual model positioning physical literacy as a determinant of habitual exercise, physical activity, and health (Cairney et al. 2019a). Emerging empirical evidence suggests that physical literacy and its constituting components (e.g., motivation and confidence, physical competence, and knowledge and understanding) are associated with objectively measured moderate-to-vigorous physical activity (MVPA) (Coyne et al. 2018), improved adherence to 24-hour physical activity guidelines (Belanger et al. 2018), and reduction in different modes of sedentary behaviour among Canadian children (Saunders et al. 2018).

Some studies, however, have dissected and critiqued the relationship between physical literacy's elements/domains and health outcomes. For example, Said (2019) reported that the physical literacy levels of 338 elementary school students (aged 7-12 years) in Gorontalo, Indonesia were examined by testing their performance on several fitness tests (including the sprint test, pull-up test, sit-up test, vertical jump test, and medium run test). The author concluded that students had different levels of physical literacy, ranging from "very low" to "good." Significantly, while some components of physical fitness, alongside movement skills, are recognized as part of the physical domain of physical literacy, the concept also includes psychological, social, and cognitive aspects (Sport Australia 2019).

Another study assessed physical literacy among Canadian children, utilizing the Canadian Assessment of Physical Literacy (CAPL), and reported that higher domain scores for motivation and confidence, and physical competence were predictive of meeting physical activity ($\geq 12,000$ steps ≥ 6

days/week) and sedentary behaviour (≤ 2 h screen time/day) guidelines (Belanger et al. 2018). Approaching the construct this way hinders a full and complete understanding of physical literacy. Indeed, it remains unclear how these studies—although under the “physical literacy” umbrella—differ from other studies that have examined the relationship between separate variables (such as motivation, physical competence, and confidence) and health outcomes.

Future research should investigate the relationship between physical literacy, treated as an aggregate measure of all its constituting elements/domains, and health outcomes, including physical, social, and cognitive health. This approach could present a more complete picture of the importance and predictive validity of the concept. It could also help clarify whether increased levels of overall physical literacy are indeed associated with higher levels of physical activity and vice versa, utilizing both cross-sectional and longitudinal study designs. For longitudinal designs, it would be very useful to have tools which could track physical literacy from childhood, to see how physical literacy levels change across time and according to life circumstances. Of course, such tools would have to consider contextual sensitivities and would be suitable for use for only a certain age, to provide a snapshot of physical literacy levels.

The role of teachers in developing children’s physical literacy

Existing research recognizes the foundational role teachers play in fostering children’s understanding and development of physical literacy (Durden-Myers and Keegan 2019; Stanec and Murray-Orr 2011). According to Whitehead (2013), HPE teachers are qualified professionals who can help lay the right foundation for children to begin and make progress in their physical literacy development. Indeed, school-based HPE lessons have been identified as the most common context for children to enhance their physical literacy (Edwards et al. 2019). Teachers can assist children to develop the motivation, confidence, creativity, and competence required to engage in a wide range of movement that benefits the whole-person (Stanec and Murray-Orr 2011). However, to effectively teach children the concepts within physical literacy, teachers must be well-versed in those concepts themselves. Through adequate knowledge and understanding of physical literacy, teachers can prepare students to take responsibility

for maintaining a healthy lifestyle (Sum et al. 2018). Thus, it becomes necessary to explore how teachers (especially physical educators) articulate the concept of physical literacy.

Teachers' understanding of physical literacy

To date, very few studies have investigated teachers' understanding of physical literacy (Robinson et al. 2018). Extant literature suggests that the concept is often misinterpreted by teachers, an understandable result given the contrasting definitions and conceptualizations (Lynch and Soukup 2016; Stoddart and Humbert 2017; Robinson et al. 2018). To further complicate the issue, physical literacy is not explicitly stated in the HPE curriculum in some countries, including Australia (Macdonald and Enright 2013). Consequently, it is likely that teachers view teaching/assessing children's physical literacy as not being part of their "job description." Indeed, due to the lack of curriculum alignment, policy, and mandated practice, teachers do not have to be accountable for physical literacy assessment or teaching. However, findings from Canada suggests that many teachers prioritize students' health and are willing to provide opportunities for them to build their physical literacy (Stanec and Murray-Orr 2011).

Stanec and Murray-Orr (2011) indicated that although Canadian elementary classroom teachers self-identified as being somewhat physically literate, their answers to follow-up questions indicated little knowledge of the concept. The data also highlighted teachers' perceived lack of education and professional development opportunities, which can be a barrier to incorporating physical literacy concepts in teaching. Teachers reportedly needed adequate professional preparation on how to effectively and successfully incorporate physical literacy concepts into their classroom space, in order to support children's physical literacy development.

More recently, Robinson & colleagues' (2018) qualitative case study of 12 PE teachers, from four PE teacher associations in Canada, reached some interesting conclusions. The authors' findings indicated that some teachers did not see any difference between being physically literate and physically educated (Robinson et al. 2018). Whitehead (2013) identified physical education and physical literacy as two distinct concepts; the former serves as an avenue through which the latter can be promoted.

Furthermore, some teachers equated fundamental movement skills (FMS) with physical literacy (Robinson et al. 2018). To clarify, FMS are basic skills needed to perform more specialized movements, games, sports, and other forms of physical activity. They include object control skills (e.g., throwing and catching), locomotor skills (e.g., jumping and running) and stability skills (e.g., stretching and balancing) (Gallahue et al. 2012). The physical literacy literature recognizes the importance of these skills; however, several scholars agree that FMS do not in themselves constitute the true essence of the holistic concept of physical literacy (Keegan et al. 2019; Whitehead 2019, 2013).

The teachers in Robinson and colleagues' (2018) study also attempted to apply their traditional understandings of "literacy" (i.e., being able to read and write) to physical literacy, in the sense that physical literacy to some teachers represented having a clear knowledge and understanding of the language of movement (Robinson et al. 2018). In another study in the United States, Lynch and Soukup (2016) sought to clear up the uncertainty around PE-associated terms, including HPE, health literacy, and physical literacy. Findings revealed that "despite the term physical literacy being stated in the HPE standards, there were cases where teachers indicated discourses and ideologies that were associated with the dualistic philosophy rather than monist philosophy" (Lynch and Soukup 2016, p. 17). This is inconsistent with Whitehead's (2010) conceptualization of physical literacy, which advocates a philosophical shift from dualism to monism wherein the body and mind are viewed as one and intricately linked.

According to Delaney et al. (2008), the extent to which programs designed to enhance children's physical literacy experience succeed is dependent on a gamut of factors, one of which is the competence of individuals who deliver the programs (often HPE professionals). Teacher education and continuing professional development are essential for appropriate delivery of programs designed to develop physical literacy in children (Delaney et al. 2008) and could be effective in increasing teachers' understanding of the physical literacy concept (Durdan-Myers and Keegan 2019). In a recent study, Edwards et al. (2019) reported that a 6-month professional development intervention was effective in upskilling primary school teachers' knowledge and operationalization of physical literacy. Given the instrumental role teachers play in fostering physical literacy in young children (Stanec and Murray-Orr 2011; Stoddart and Humbert 2017; Whitehead 2013), efforts should be targeted at better understanding

and addressing the confusion that exists among teachers regarding physical literacy and related concepts such as physical education and physical activity. Physical literacy researchers should also foster collaborations with teachers to align theory to practice (Durdan-Myers and Keegan 2019).

Additionally, Jurbala (2015) suggested that physical literacy assessment protocols, which usually proceed from different definitions, further add to the confusion around the concept. It is our belief that to clarify the concept and its constituents, teachers need a comprehensive and aggregate assessment of physical literacy. This assessment should identify a specific definition of physical literacy, such as the Australian one, then highlight the different domains and elements that constitute the concept. Indeed, this has the potential to broaden some teachers' perceptions of physical literacy, moving from a somewhat narrow and fragment definition (e.g. FMS) to one that is more holistic and comprehensive. What is crucial in this process though, is that teachers assist in developing the tool by providing their thoughts regarding the assessment of physical literacy, so they can help ensure the tool's value and relevance for education.

Do teachers have a role in assessing children's physical literacy?

Assessing physical literacy in children (aged 5-12 years) is crucial, as recent evidence demonstrates that physical activity levels are low among children worldwide (Aubert et al. 2018). Also, childhood is a key life stage where important physical activity behaviours and correlates are formed, such as motor competence, coordination, and confidence (Belanger et al. 2018). Tremblay and colleagues highlighted the importance of developing conceptually sound and comprehensive objective measures for physical literacy as a means of increasing the relevance of HPE, providing policymakers with surveillance data needed for allocating resources, and monitoring HPE curricular outcomes (Tremblay 2010).

Teacher proxy-reporting of physical literacy for children aged 5-12 years is also needed as the literature demonstrates that children (especially those below age 8) possess limited cognitive abilities to make accurate or reliable self-assessments of their own capabilities (Barnett et al. 2016; Estevan et al. 2018; Harter and Pike 1984). Children are also limited in their ability to recall specific activities/events that occurred in the past (Baranowski 1988). Indeed, researchers (including those

studying physical activity) have relied on teachers as proxy-respondents to obtain information about children (Manios et al. 1998; Telford et al. 2004). Bardid et al. (2018) suggested that teachers may provide more reliable estimates of a child's capabilities (e.g. motor competence) than self-reports. Research on motor competence, a central aspect of the physical domain of physical literacy, provides some evidence that for young children, associations between PE teachers' proxy-reports and actual motor skills may be stronger than the child's self-reports (Estevan et al. 2018; Liong et al. 2015). There is also evidence that teachers' perceptions of children's motor competence are predictive of other elements of physical literacy (such as body coordination, strength, and agility) in children (Lalor et al. 2016).

Along similar lines, Bernstein (1977) demonstrated the need to integrate and align curriculum, pedagogy, and assessment in order to achieve high-quality HPE. Indeed, assessment is central to teaching and learning and is integral to understanding children's progress and achievement (Government of Ireland 1999). Research shows that teachers recognize the importance of monitoring progress as part of pedagogy (Green et al. 2018). However, implementing assessment in physical education has many obstacles, most notably insufficient time in the day for student learning (Lund and Kirk 2019). According to Lund and Kirk (2019), there is not enough time to instruct and meet activity recommendations for children while completing assessments. Furthermore, although teachers know that they should assess, they are often unable to identify appropriate assessments for measuring students learning. Most of the assessments used in physical education are developed by the teachers themselves (Lund and Kirk 2019). Barnett et al. (2019) also noted that teachers are often offered limited guidance on assessment protocols to use for physical literacy. Physical literacy assessment tools could potentially align with curriculum, especially if evaluating physical literacy is specified in the curriculum, while also informing HPE lessons and activities. Teachers' assessment of children's physical literacy could assist in the identification of children's physical literacy levels and specific domains that are suboptimal and in need of immediate intervention; it could also provide a criterion for assessing children's achievements in relation to their physical literacy learning. However, there are few comprehensive tools available for teachers to use when monitoring physical literacy (Robinson and Randall 2017).

The need for broader assessment of physical literacy

Before considering the tools available for teachers to assess physical literacy, it is important to briefly discuss assessment approaches to the construct. In recent years, few measures have been developed to measure/assess physical literacy in its entirety. Measurement or assessment is defined as gathering empirical data through quantitative or qualitative methods in order to chart, monitor, observe, and/or evaluate physical literacy (Edwards et al. 2018). Existing protocols for assessing overall physical literacy differ in terms of the domains and elements assessed. This may be attributed to the differing physical literacy definitions (e.g., the Canadian Consensus Statement definition of physical literacy) adopted by tool developers. Whitehead (2019) suggested that these different definitions are likely to be contextually sensitive and should be evaluated based on their ability to effectively influence physical activity promotion practices in the contexts in which they have been adopted.

Edwards et al. (2017) advocated starting with a definition and philosophical standpoint before any attempt at measurement. Edwards et al. (2018) identified two philosophical perspectives on physical literacy assessment: idealistic and pragmatic approaches. Idealists argue against separating and measuring the components of physical literacy and tend to approach the concept via qualitative methods like in-depth interviews. In contrast, pragmatists are in favour of measuring physical literacy, as they argue that research can only be evaluated based on its practical implications (Edwards et al. 2018). We support a pragmatic approach where physical literacy can and should be quantitatively measured. We believe that measurement can provide practitioners and policy makers with empirical data on the impact of physical literacy interventions and initiatives around the world (Tremblay and Lloyd 2010), as well as assist in identifying the correlates and determinants of physical literacy in specific populations (Edwards et al. 2018). This manuscript will adopt the comprehensive physical literacy definition and framework proposed by Sport Australia— see Keegan et al. (2019) for a detailed articulation of the processes involved in reaching this definition and framework.

The Australian Framework for Physical Literacy

Australia’s physical literacy definition consists of four statements: *Core*— physical literacy is lifelong, holistic learning acquired and applied in movement and physical activity contexts; *Composition*— physical literacy reflects ongoing changes integrating physical, psychological, cognitive, and social capabilities; *Importance*— physical literacy is vital in helping us lead healthy and fulfilling lives through movement and physical activity; and *Aspiration*— a physically literate person is able to draw on their integrated physical, psychological, social, and cognitive capabilities to support health-promoting and fulfilling movement and physical activity. This last component is relative to the individual’s situation and context throughout the lifespan (Keegan et al. 2019). The Australian Physical Literacy Framework identified 30 elements considered foundational to physical literacy development in individuals (Sport Australia 2019). These elements, which span four inter-related domains (physical, psychological, social, and cognitive), were explained using the Structure of Observed Learning Outcomes (SOLO) taxonomy. That is, a learner may progress in their physical literacy learning from uni-structural (learning one aspect of a given task) to multi-structural (learning several aspects of the task) (Barnett et al. 2019). Table 1 illustrates the domains, elements (and their definitions), and available physical literacy teacher assessment tools, matched against the elements in the Australian Physical Literacy Framework. The next step is establishing a teacher tool for assessment of all the 30 elements in children, in order to gain a holistic picture of children’s physical literacy.

Table 1. Domains, elements (and their definitions), and available physical literacy teacher assessment tools, matched against the elements in the Australian Physical Literacy Framework

No	Elements in the Australian Physical Literacy Framework (Sport Australia 2019)	Definitions (Sport Australia 2019)	Teacher-administered physical literacy assessments matched against the Australian Physical Literacy Framework
Physical Domain			
1.	Movement skills	Movement skills that allow a person to move (on land, water, snow, or ice), from one place to another	CAPL#, PLAYfun, PLAYbasic, PFL#
2.	Moving with equipment	Movement skills used to move on, in, or with equipment from one place to another	
3.	Object manipulation	Movement skills that use one or more body parts to move or manipulate an object.	PLAYfun
4.	Coordination	Ability to move different body parts in a controlled, smooth and efficient manner	PLAYfun

5.	Stability/balance	Skills involving balance and weight transfer.	PLAYfun, PLAYbasic, PFL#
6.	Flexibility	Capacity of a joint or muscle to move through its full range of motion	CAPL#
7.	Agility	Ability to quickly change body position and/or direction of the body	
8.	Strength	Ability to carry out work against resistance.	CAPL#, PFL#
9.	Muscular endurance	Ability to use muscles to repeatedly exert force over a sustained period of time	CAPL#
10.	Cardiovascular endurance	Ability of the heart and lungs to deliver oxygen to working muscles	CAPL#, PFL#
11.	Reaction time	Length of time taken to respond to a given stimulus	
12.	Speed	Ability to move quickly across the ground, through the water, or through the air, or to move limbs rapidly	
<hr/>			
Psychological Domain			
13.	Engagement and enjoyment	Positive emotions and experiences derived from movement and physical activity	
14.	Confidence	A belief in self-worth and ability to perform in movement and physical activity	
15.	Motivation	Reasons for engaging in movement and physical activity in response to internal or external factors	
16.	Connection to place	Appreciation and connection to the environment, both built and natural, in relation to movement and physical activity	
17.	Self-perception	Understands self in relation to movement and physical activity and recognises personal strengths and areas for development	
18.	Self-regulation (emotions)	Ability to manage emotions and resulting behaviours in relation to movement and physical activity	
19.	Self-regulation (physical)	Ability to recognize and manage physical signals such as pain, fatigue, and exertion	
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Social Domain			
20.	Relationships	Building and maintaining respectful relationships that enable a person to interact effectively with others	
21.	Collaboration	Social skills for successful interaction with others, including communication, cooperation, leadership, and conflict resolution	
22.	Ethics	Moral principles that govern a person's behaviour, relating to fairness and justice, inclusion, equity, integrity, and respect	
23.	Society & culture	Appreciation of cultural values which exist within groups, organisations, and communities	
<hr/>			
Cognitive Domain			
24.	Content knowledge	Factual knowledge a person can understand and convey; often important in recognition, recall, and planning	

25.	Safety & risk	Understanding of risks, risk management, and safety considerations for self and others in movement contexts
26.	Rules	Explicit or understood regulations and principles governing conduct or procedures within movement and physical activities
27.	Reasoning	Consciously making sense of things by verifying facts and applying logic to construct, change, or justify practices and beliefs
28.	Strategy & planning	Determining how set goals will be achieved using reflection and available resources
29.	Tactics	Planned and ad hoc decisions and actions, employed in the moment for the pursuit of goal/s
30.	Perceptual awareness	Tacit knowledge used to quickly recognise the environment and make accurate decisions based on experiences, observations, emotions, and intuition.

#CAPL – The Canadian Assessment of Physical Literacy; PFL – Passport for Life

Teacher-report tools to assess children’s physical literacy

While it is beyond the scope of this paper to exhaustively review and analyse all available measurement options for the physical literacy elements, this section summarizes existing teacher-report tools for assessing children’s physical literacy. A global review of countries engaged in pursuing physical literacy initiatives indicates that North America, specifically Canada, has made significant progress with regards to developing assessment tools for physical literacy (Green et al. 2018; Spengler and Cohen 2015). Popular tools designed for teachers’ use when assessing physical literacy include the Physical Literacy Assessment for Youth (PLAY) *fun* and *basic* tools (Canadian Sport for Life Society 2013), the Passport for Life (PHE Canada 2013), and the Canadian Assessment of Physical Literacy (Healthy Active Living and Obesity Research Group 2017). The PLAY*fun* and PLAY*basic* tools are contained within a suite of six measures designed by Canadian Sport for Life (CS4L). They are both designed so trained professionals, including PE teachers, can assess fundamental movement skills of children aged seven years and older (Canadian Sport for Life Society 2013). Recently, the PLAY PE teacher was added to the PLAY tools (Whitehead 2019). The CS4L recommends using all the PLAY tools (i.e., PLAY*fun*, PLAY*basic*, PLAY*self*, PLAY*parent*, PLAY*coach*, and PLAY*inventory*) together for a

complete assessment of physical literacy (see Table 2 for assessment categories of the PLAY tools). Cairney et al. (2018) and Stearns et al. (2019) provided evidence for the psychometric properties of the PLAYfun tool.

Table 2. Assessment categories of the PLAY tools (Canadian Sport for Life Society 2013).

PLAY Tool	PLAYfun	PLAYbasic	PLAYself	PLAYparent	F
Assessment categories	Five fundamental movement skills including run, hop, overhand throw, kick, and balance	18 fundamental movement skills and sports-related skills, grouped into five categories: locomotor, running, object control—upper body, object control—lower body, and balance, stability, and control	Environment (participating in water, gym, outdoor, snow/ice, playground activities), self-description, fitness, and relative ranking of literacies (literacy, numeracy, and physical literacy)	Cognitive domain (motivation, confidence, and comprehension), motor competence (locomotor and object control), environment (participating in water, indoor, outdoor, and snow/ice activities), and fitness	C (a n (c o l (i i s f
Targeted assessors	Trained professionals: coaches, physiotherapists, athletic therapists, exercise professionals, and individuals trained in movement analysis	Trained professionals: coaches, physiotherapists, athletic therapists, exercise professionals, and individuals trained in movement analysis	Children and youth	Parents	C p tl p r

The Passport for Life (PFL), developed by Physical and Health Education Canada (2013)—a national professional body for physical and health educators and school administrators in Canada (Green et al. 2018)—is a formative assessment tool for use by PE teachers of children in Grades K to 12 (Lodewyk 2019). The tool assesses four components: active participation, movement skills, fitness skills, and living skills (PHE Canada 2013). There is emerging evidence on the psychometric properties of the PFL tool (Lodewyk 2019). The Canadian Assessment for Physical Literacy (CAPL) was developed by the Healthy Active Living and Obesity Research Group (HALO 2017). The CAPL tool has undergone extensive modifications and its latest version assesses four domains of physical literacy prescribed in the Canadian Physical Literacy Consensus Statement: affective (motivation and confidence), behavioural (PA engagement), physical (physical competence), and cognitive (knowledge and understanding) (Gunnell et al. 2018). There is also evidence regarding the psychometric validity of

the CAPL tool (Longmuir et al. 2015). More recently, the International Physical Literacy Association (IPLA) has offered a draft matrix/instrument which teachers can use, in collaboration with young people, to chart physical literacy with descriptors related to motivation, confidence, physical competence, and knowledge and understanding, which is in line with their current definition of physical literacy (Whitehead 2019).

While there is some consistency in the elements and domains (e.g. motivation and confidence, physical competence, knowledge) assessed by existing tools based on the definitions adopted by the tool developers, they fall short in assessing all 30 elements (e.g. safety & risk, connection to place, ethics, collaboration) in the four domains (physical, psychological, social, cognitive) proposed by Australia's Physical Literacy Framework. Presently the CAPL, PFL, PLAYfun, and PLAYbasic are the main measures designed for use by teachers to assess children's physical literacy levels. However, if utilized in isolation, these tools provide a disproportionate focus on the physical competence aspect of physical literacy, thereby neglecting other aspects of physical literacy such as the social and cognitive domains (see Table 1).

Teacher reports of children's physical literacy according to the Australian definition

Despite the growing momentum around physical literacy, there is currently a lack of teacher proxy-report measures, particularly those designed to capture all 30 elements within the Australian Physical Literacy Framework, for children aged 5-12 years. Physical literacy assessment has tended to focus on elements within the physical domain (e.g. physical competence) (Robinson and Randall 2017), which can be assessed through standardized objective assessments, rather than elements within other physical literacy domains which are mostly assessed via self- or proxy-report measures. This presents a narrow interpretation of the multi-dimensional and holistic concept of physical literacy. Such an interpretation may be prevalent because some countries define physical literacy solely in terms of motor competence (Splenger and Cohen 2015), or because the most robust evidence for any of the constructs within physical literacy and health is for motor competence. This approach creates a self-fulfilling circle, where subsequent researchers only assess the motor competence aspect of physical literacy.

Considered as individual constructs, most of the elements within the Australian Physical Literacy Framework already have measurement options (Barnett et al. 2019). By taking into account the holistic nature of physical literacy, a comprehensive, valid, and reliable assessment tool designed to capture all the 30 elements in the Australian Physical Literacy Framework would be extremely beneficial to teachers within the Australian context and others who want to measure their students' performance and achievement to improve learning. For example, the element of "collaboration" in the social domain of the Australian Physical Literacy Framework demonstrates that every physically literate individual should possess the social skills needed (i.e., showing empathy, conflict resolution, cooperation, and leadership) to successfully interact with others in movement and physical activity contexts (Sport Australia 2019). This element is fundamental, and arguably as equally important as other elements, so it should be assessed in children. Providing teachers with comprehensive, valid, and reliable physical literacy proxy-report tools, which take into consideration all the elements recognized by the Australian Physical Literacy Framework, will provide the opportunity for children to be assessed on all the relevant components of physical literacy. This approach also has the potential to move the focus away from interpreting physical literacy narrowly, solely in terms of fundamental movement skills.

Conclusion

Despite the growing evidence regarding the importance of physical literacy, international consensus (i.e., across researchers and practitioners) on the definition, application, and operationalization of the concept remains elusive (Belton et al. 2019; Edwards et al. 2017). The way physical literacy is defined has important implications for policies and practices designed to promote physical literacy, for teaching and learning approaches, and for monitoring and assessment of physical literacy learning. Even so, physical literacy is gaining momentum among researchers and practitioners around the world as a medium through which physical activity participation can be increased. Teachers play a critical, foundational role in helping children develop the skills, confidence, and motivation needed to take

responsibility for their own lifelong physical activity. The literature suggests that teachers do recognize the importance of monitoring progress as part of pedagogy (Green et al. 2018). The Australian Physical Literacy Framework provides a comprehensive framework for physical literacy and proposes that learning spans four domains with 30 elements. At the moment, teachers who may be interested in the elements within this Framework do not have appropriate measures to assess children's physical literacy. Clarifying the concepts of physical literacy and providing teachers with a comprehensive, valid, and reliable proxy-report tool will enable the holistic physical literacy assessment of children. This paper identifies the need and rationale for the development of such a tool for assessing physical literacy in children aged 5-12 years.

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