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ARTICLE

Defining Physical Literacy for Application in Australia: A Modified Delphi Method

Richard J. Keegan
University of Canberra

Lisa M. Barnett
Deakin University

Dean A. Dudley
Macquarie University

Richard D. Telford
University of Canberra

David R. Lubans
The University of Newcastle

Anna S. Bryant
Cardiff Metropolitan University

William M. Roberts
University of Gloucestershire

Philip J. Morgan
The University of Newcastle

Natasha K. Schranz
University of South Australia

Juanita R. Weissensteiner
New South Wales Office for Sport

Stewart A. Vella
University of Wollongong

Jo Salmon
Deakin University

Jenny Ziviani
The University of Queensland

Anthony D. Okely
University of Wollongong

Nalda Wainwright
University of Wales Trinity Saint David

John R. Evans
University of Technology Sydney

Purpose: The development of a physical literacy definition and standards framework suitable for implementation in Australia. **Method**: Modified Delphi methodology. **Results**: Consensus was established on four defining 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 his/her integrated physical, psychological, cognitive, and social capacities to support health promoting and fulfilling movement and physical activity, relative to the situation and context, throughout the lifespan. The standards framework addressed four learning domains (physical, psychological, cognitive, and social), spanning five learning configurations/levels. **Conclusion**: The development of a bespoke program for a new context has important implications for both existing and future programs.

Keywords: education, expert, consensus, policy, sport

Physical literacy is a concept that has generated significant interest as a way of addressing the global problems of physical inactivity and disengagement from physical pursuits (Shearer et al., 2018; Whitehead, Durden-Myers, & Pot, 2018). Sedentary lifestyles remain a significant problem around the world; for example, of the 56 million people who die each year, 3.2 million deaths (six people per minute) can be specifically attributed to physical inactivity (World Health Organization, 2014, 2015). The

Keegan and Telford are with the Faculty of Health, Research Institute for Sport and Exercise (UCRISE), University of Canberra, Canberra, Australian Capital Territory, Australia. Barnett is with the School of Health and Social Development, Institute for Physical Activity and Nutrition (IPAN), Deakin University, Melbourne, Victoria, Australia. Dudley is with the Department of Educational Studies, Macquarie University, Sydney, New South Wales, Australia. Lubans and Morgan are with the Priority Research Centre for Physical Activity and Nutrition, School of Education, Faculty of Education and Arts, The University of Newcastle, Callaghan, New South Wales, Australia. Bryant is with the Cardiff School of Sport and Health Sciences, Cardiff Metropolitan University, Cardiff, United Kingdom. Roberts is with the School of Sport and Exercise, University of Gloucestershire, Gloucester, United Kingdom. Schranz is with the Alliance for Research in Exercise, Nutrition and Activity, School of Health Sciences, University of South Australia, Adelaide, South Australia, Australia. Weissensteiner is with the New South Wales Office for Sport, Silverwater, New South Wales, Australia. Vella is with the School of Psychology, Faculty of Social Sciences, University of Wollongong, Wollongong, New South Wales, Australia. Salmon is with the Institute for Physical Activity and Nutrition (IPAN), Deakin University, Melbourne, Victoria, Australia. Ziviani is with the School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Queensland, Australia. Okely is with Early Start, Faculty of Social Sciences, University of Wollongong, Wollongong, New South Wales, Australia. Wainwright is with the School of Sport Health and Outdoor Education, University of Wales Trinity Saint David, Carmarthen, United Kingdom. Evans is with Sport and Exercise Science, University of Technology Sydney, Sydney, New South Wales, Australia. Keegan (richard.keegan@canberra.edu.au) is corresponding author.

total economic cost of inactivity is estimated to be U.S. $67.5 billion globally (Ding et al., 2016). Physical inactivity is a significant and pervasive threat common to many nations, undermining productivity and growth, and reducing quality of life for millions of people (Ding et al., 2016). Nonetheless, when Metcalf, Henley, and Wilkin (2012) conducted a systematic review and meta-analysis of 30 children's physical activity interventions that used objective outcome measures, they found an average increase of just 4 min per day. This does not instill great confidence in the success, to date, of those interventions that have been used in controlled trials seeking to increase children's physical activity and may suggest that reformulation of these interventions may be necessary.

Physical literacy was proposed (Whitehead, 2001, 2010) as a way of refocusing the existing messaging around physical activity for health, which has often involved avoiding illness and ill-health, a relatively ineffective message for physical activity interventions (Ekkekakis & Zenko, 2016; Zenko, Ekkekakis, & Kavetsos, 2016). Likewise, physical literacy was asserted as a counterargument to the view that all young people need to gain skills to succeed in sport, because only a tiny proportion of children can go on to compete at elite levels of competitive sport, meaning that such a message can be demotivating for those not able to attain this level of proficiency (Côté, Strachan, & Fraser-Thomas, 2008; Fraser-Thomas, Côté, & Deakin, 2008). A key point emphasized by physical literacy literature is that it applies to children and adults, throughout all stages of life (Whitehead, 2001). The most prominent definition of physical literacy, as advocated by the International Physical Literacy Association (IPLA) is "the motivation, confidence, physical competence, and knowledge and understanding to value and engage in physical activity for life" (IPLA, 2017), which represents the necessary attributes and predispositions to engage in health-promoting physical activity throughout life. Hence, to many, the philosophy of physical literacy and its underpinning concepts offers a way forward in the attempt to address the global problem of insufficient physical activity (Jurbala, 2015; Lundvall, 2015). Notably, Whitehead (2010) proposed that physical literacy may need to be interpreted and articulated differently in diverse cultures and countries (Sport New Zealand, 2018). Australia has its own unique history and traditions from both Indigenous cultures and subsequent colonization, as well as a unique arrangement of federal and state governments, governing bodies, and regulatory agencies (Keegan, Dudley, & Barnett, in press). As such, and in recognition of the need to be contextually sensitive, this research sought to develop a definition and standards framework for physical literacy that would be appropriate for Australia. Importantly, however, the development of such resources for one country may still have relevance and implications for other physical literacy initiatives around the world.

While the concept's roots trace back many decades (Whitehead, 2001, 2010), researchers and practitioners in health, physical education, sporting participation, and recreational movement pursuits have embraced physical literacy as a new paradigm for understanding the roots of behaviors across diverse contexts (Jurbala, 2015; Longmuir & Tremblay, 2016; Lundvall, 2015). Researchers, policy-makers, teachers, and coaches have all engaged with programs promoting physical literacy in many countries (e.g., Australian Sports Commission [ASC], 2017a; Spengler & Cohen, 2015). In addition to the aforementioned definition, however, physical literacy literature emphasizes the physical embodiment of human existence, and the inherent physical movement that permeates all human experiences. However, this alone does not constitute a full definition (Hardman, 2008). Rather, physical literacy was proposed to invoke "a holistic engagement that encompasses physical capacities embedded in perception, experience, memory, anticipation and decision making" (Whitehead, 2001, p. 131). Hence, physical literacy refers to both the potential to engage with, and learn from, our physical embodiment as well as a configuration of this learning whereby the individual becomes sufficiently competent and predisposed to always engage in health-promoting movement pursuits. This simultaneous invocation of two meanings has led to significant debate and dissatisfaction (Cairney, Bedard, Dudley, & Kreillaars, 2016; Edwards, Bryant, Keegan, Morgan, & Jones, 2017; Hyndman & Pill, 2017; Jurbala, 2015). In fact, one significant barrier to physical literacy realizing its potential is the diverse, sometimes conflicting, definitions that different groups adopt for physical literacy (Shearer et al., 2018). This situation has been critiqued as causing confusion and conflict, and even for being too divergent from Whitehead's "original" intended meaning (Hyndman & Pill, 2017; Pot, Whitehead, & Durden-Myers, 2018; Robinson, Randall, & Barrett, 2018); but of course, simply because a concept has been formulated before does not prevent other researchers from exploring and testing that formulation, or from seeking approaches that are more suitable to a specific local context (e.g., Whitehead, 2010). Recent systematic reviews (Edwards et al., 2017; Edwards, Bryant, Keegan, Morgan, & Jones, 2018) and narrative overviews (Green, Roberts, Sheehan, & Keegan, 2018; Shearer et al., 2018) have analyzed and compared the differing approaches to conceptualizing and operationalizing physical literacy. These reviews note that while adopting different approaches, most researchers and practitioners promoting physical literacy agree regarding the underpinning formulation of a holistic concept, and the importance of adopting an approach that emphasizes holistic benefits instead of separately pursuing health benefits, skill development, or competitive success. As such, this study sought to develop a definition and framework for physical literacy that was both coherent and philosophically aligned, and specifically developed to be ready-for-implementation by Australian teachers, practitioners, policy-makers, and researchers alike.

When it comes to deciding, which approach to adopt for the promotion of physical literacy in a new setting, organizations may either simply adopt one of the approaches from another context, relatively intact, or seek to develop a local, contextually sensitive framework (cf. Whitehead, 2010). On one hand, several groups have argued for the adoption of a single, agreed definition and framework, a priori, to avoid confusion as described by Shearer et al. (2018). On the other hand, Edwards et al. (2017, 2018) argued that such a decision would not allow for the necessary scholarly debate and conceptual development to occur, and that research demands a degree of pluralism in order for concepts to be compared and evaluated over time (Feyerabend, 1975; Lakatos, 1970). Over time, researchers who clearly articulate the specific definition and underpinning assumptions that their physical literacy program adopts would facilitate the comparison of which approaches generate which outcomes (Edwards et al., 2017, 2018). The main problem for this approach of "tolerating diversity" is that, in the short term, it does not help groups/agencies seeking to make evidence-based decisions about how best to implement a large-scale (e.g., nationwide) physical literacy initiative. Without the necessary time and resources to wait for a resolution to emerge, a third option for those looking to implement physical literacy initiatives (as was the case here) would be to develop and evaluate a custom-designed, evidence-informed framework, in collaboration with key stakeholders and practitioners, with its own clearly defined assumptions and principles. This third method ensures that

the resulting approach is sensitive to local cultural and practical considerations, while also offering another perspective from which to compare and evaluate existing programs, thus informing the scientific discourse (Feyerabend, 1975; Lakatos, 1970).

As this research was associated with a national implementation project, the resulting definition and framework had to be amenable with immediate adoption and implementation in Australian schools, community sport settings, elite sport, research, and policy-making contexts, spanning federal and state governments, and education, health, and sports departments. We set out to develop a new definition and framework for physical literacy that (a) was aligned with current usage, expectations, and intentions for the physical literacy concept; (b) was clear, understandable, and internally consistent; (c) included defined concepts that could be progressed and differentiated from initial learning through to high-order skills and attributes; (d) built upon the strengths of, and lessons from, current practice and existing systems worldwide; (e) was informed by programs in other counties, including Canada, the United Kingdom, New Zealand, and the United States; (f) was specifically sensitive and appropriate to the Australian context; (g) was aligned to schools, sporting organizations, and family contexts; and (h) was evidence informed—that is, compatible with, and responsive to, existing research evidence (cf. Nelson & Campbell, 2017; Nevo & Slonim-Nevo, 2011).

These considerations were addressed by deploying a Delphi methodology, drawing on the expertise of leading Australian researchers and practitioners, with the guidance of international colleagues. Our research question was simply, how do leading experts in Australia—supported by international partners—define and construe physical literacy?

Method

Participants

The Delphi method does not use a randomly sampled group, but rather experts are purposively targeted, after being identified by the research team prior to data collection (Hsu & Sandford, 2007). The selection of such experts can be problematic, as both the criteria to qualify as an expert and, in this case, the nature of the subject matter can be poorly defined (Hsu & Sandford, 2007; Keeney, Hasson, & McKenna, 2011). Our selection process was informed by (a) our preceding literature search (cf. Hasson, Keeney, & McKenna, 2000; Hsu & Sandford, 2007; Keeney et al., 2011); (b) geographical constraints (i.e., chiefly those working and living in Australia, with advice also sought from outside Australia for triangulation purposes); and (c) consideration of all the previously listed focus areas, including schools/education, community sport, youth sport, elite sport, health promotion, disability sport, and Indigenous sport/physical activity. Therefore, individuals were considered to be eligible to participate if they had related backgrounds and experiences concerning the target issue (cf. Pill, 1971), as well as a vested interest in promoting physical activity, physical education, sport participation, or sporting performance. We did not begin Round 1 of the study until we had agreement from the three principal investigators and the project's key stakeholder (ASC) that all the required backgrounds and skill sets were contained within our panel. Delbecq, Van de Ven, and Gustafson (1975) suggested 10–15 panelists may be a workable panel size, to balance containing sufficiently diverse expertise against the likelihood of increased debate, and thus time impost, for the participants. Including the three principal investigators, our panel contained 18 participants, as detailed in Table 1. The project was approved by the Human Research Ethics Committees of the University of Canberra (HREC16-162) and Deakin University (2016-272).

Facilitation of Workshops and Surveys

The face-to-face workshops were facilitated using Microsoft PowerPoint (Redmond, WA), along with stationery such as large sheets of paper, sticky notes, and board pens. On both occasions, the content of the introductory presentations was derived from the preceding literature review (ASC, 2017a). Some panel members opted to be linked into the meetings via Skype teleconferencing. The online survey was administered through Qualtrics (Provo, UT) survey software, and then exported into Microsoft Excel for analysis (Version 16.0.10325.20082, Microsoft Office Professional 2016; Redmond, WA).

Design

The Delphi technique is an iterative process, designed to combine expert opinion, in order to arrive at a group consensus (Hsu &

Table 1 Summary of Panel Members

Characteristic	Descriptors	*N*
Sex	Female	8
	Male	11
Age (years)	Average	40.4
	Range	30–72
Location	Australia	15
	United Kingdom	8
Area of expertise (panel self-nominated)	Pedagogy (physical education and coaching)	7
	Physical education	6
	Physical activity (and/or sedentary behavior)	5
	Children and youth sport (participation, benefits)	5
	Assessment and measurement	5
	Preventive medicine and/or public health promotion	4
	Motivation	4
	Motor development and skill acquisition	3
	Physical self-perceptions	3
	Elite sports and high performance	3
	Physiotherapy/occupational therapy	2
	Talent pathway (talent identification and development)	2
	Curriculum design	2
	Australian Indigenous perspectives	1
Career length (years)	Sum	364
	Average	20.3
	Range	5–43
Number of publications (NB: several panel members were not academics, and so did not publish papers)	Sum	1398
	Average (of those who publish)	77.6
	Range	0–268

Note. One panel member recused themselves from further involvement during Phase 1.

Sandford, 2007; Keeney et al., 2011). The original method used a series of intensive surveys which were interspersed with controlled feedback (Dalkey & Helmer, 1963). The process was designed to develop through multiple stages, with each building upon the last, until an acceptable level of consensus was reached (Sumsion, 1998). To catalyze this process, our modification to the standard Delphi methodology was to conduct, present, and discuss a critical review of the literature on physical literacy, which we presented at a 1-day workshop in Sydney as part of the first phase of the study. Likewise, the second phase of the research was initiated through a group workshop in Melbourne. Each survey round was subsequently designed in light of the responses collected, with feedback and reflections from each survey feeding into the next. There were two phases to this study to address first the definition and then the standards. Each phase used the same expert panel members and comprised three formal survey rounds and one live workshop. In subsequent survey rounds, the panel members were provided with their own anonymized responses to the previous round, as well as a summary report of that round containing the group's anonymized responses. This aspect of the Delphi methodology was designed to provide the panelists with the option of reconsidering their original response. Typically, the Delphi process continues for three rounds, or until consensus is obtained (Keeney et al., 2011). Delphi studies contain several key considerations, each of which are now introduced as applied to the current study.

Consensus requirements. Consensus is typically defined as agreement among 75% of the panel (Francis et al., 2016; Hasson et al., 2000; Hsu & Sandford, 2007). In this study, 80% was the agreed target for consensus.

Questionnaire design. Each round of survey questions and their scoring options (e.g., Likert scale, yes/no, agree/disagree) were discussed and agreed between the core team and the key stakeholder before being distributed. The contents of each survey round are available on request from the first author.

Number of rounds. The Delphi method requires a minimum of two rounds (three if Round 1 is open ended). Beyond that, the number of rounds is disputed. Walker and Selfe (1996) noted that repeated rounds may lead to fatigue by respondents and increased participant attrition. We used the face-to-face group workshops (see "Procedure" section) to expedite this process, identifying key tensions and issues at these workshops before feeding those key questions into the online survey rounds (cf. Butterwick, Paskevich, Lagumen, Vallevand, & Lafave, 2006; Graefe & Armstrong, 2011; Lafave, Butterwick, Murray, Freeman, & Lau, 2013; Lafave, Katz, & Butterwick, 2008).

Feedback. We presented survey comments, anonymized, to subsequent rounds of the Delphi with draft responses and reflections where required, tracing how these comments had influenced the development of redrafted statements. Comments and debates made in the live workshops were not anonymous, nor were they formally recorded, but these sessions played an important role in facilitating rapid progression of ideas, as well as establishing a constructive and collaborative tone to the process.

Maintaining engagement and reliability/validity of responses. Due to the multiple-round process, the reliability and validity of the findings may be at risk if response rates drop during the study. For example, if the consensus reflects only the opinion of those who persisted till the end. For this reason, participant motivation is critical (Hasson et al., 2000) and we addressed this by including a selection criterion of experts with a vested interest in contributing to this topic. In addition, we offered panel members the opportunity to become coauthors on any final publication generated by the study, regardless of whether they agreed with the final outcomes or not. We also set a stringent criterion of 80% consensus for the final product(s).

Anonymity of panel members. Anonymity is proposed to facilitate the provision of open and honest views, as well as facilitating the updating or changing of opinions during the process (Keeney, Hassen, & McKenna, 2001). Anonymity was maintained during the survey rounds of the process, providing panelists with a reasonable chance to reflect on and respond to questions, without being influenced by knowing the identities behind other comments/inputs (Goodman, 1987). Responses were tallied so that each opinion carried the same weighting and importance in the analysis (Keeney et al., 2001). Given that the panel members, all experts in related areas, were likely to know one another, anonymity could not be guaranteed. Likewise, if a panel member passionately argued a particular position in the face-to-face workshops, and made the same points, or used similar language, in the surveys, it may undermine their anonymity. Anonymity is chiefly sought in order to facilitate open and honest responses from panel members, and there is little to prevent a passionate or outspoken member of any Delphi from waiving their anonymity. In this case, the diversity of responses suggested that the mixed approach (group workshops followed by anonymous surveys) facilitated a full range of perspectives from different stakeholders, as well as expediting a process that may otherwise have overrun, relative to the time requirements of the funding organization. The use of group workshops is not unprecedented, and has been advocated as promoting a collaborative approach, and even leading to stronger outcomes (Butterwick et al., 2006; Lafave et al., 2008, 2013).

Modifications to the traditional Delphi process. The inclusion of initial and midpoint face-to-face workshops was not a component of the original Delphi method, developed by Dalkey and Helmer (1963). Rather, it was adopted from the modified Ebel procedure (Butterwick et al., 2006; Lafave et al., 2008, 2013). The modified Delphi method was chosen because it encouraged expert interaction, allowing members of the panel to provide further clarification on some matters and present arguments in order to justify their viewpoints. Importantly, key decisions leading to consensus (or otherwise) were still conducted anonymously using an online survey. Studies have demonstrated that the modified Delphi method can be superior to the original Delphi method, and perceived as highly cooperative and effective (e.g., Graefe & Armstrong, 2011).

Procedure

Two phases of data collection were undertaken, with the second dependent on the outcomes of the first. These two phases of the study focused on first, defining physical literacy for the Australian audience (ultimately using a series of defining statements), and second, developing an evidence-informed standards framework. For the development of key conceptual issues and the definition, information was compiled from a substantive literature review, which was completed prior to the initiation of the Delphi process (as described earlier). Once the initial key problems and issues were presented to the panel in the first workshop, the first round of Delphi feedback served as a foundation of current opinions, from which progress could be sought. Merely reflecting the initial disagreements or tensions between viewpoints would not have

progressed the process toward consensus. Instead, debate was encouraged in the first 1-day workshop, after which resolutions to key issues were developed. For example, the panel debated and discussed the tension between whether physical literacy is a process or an end state/outcome, and whether it is simply defined by its associated concepts and behaviors (physical activity, motivation, motor competence, confidence, positive health outcomes, etc.) or is a separable concept in itself. Live, interactive discussions were *necessary* for these issues to be debated and resolved to the panel's satisfaction (i.e., >80% consensus). For the subsequent development of a standards framework, key overarching issues requiring consensus were developed, before being submitted to the expert panel for anonymous review, feedback, and consensus-seeking. Additionally, however, the panel was invited to review the wordings of specific level-descriptors and statements within the developing product, and wherever possible this feedback was implemented, either to one specific statement or considered in relation to a number of similar/related statements.

Phase 1 and Phase 2

Phase 1. Phase 1 of the study, developing an evidence-informed definition of physical literacy, included six steps. The study began with a systematic review of the literature on physical literacy, and was followed by the first round of Delphi survey, the first 1-day workshop, the second round of Delphi survey, the third round of Delphi survey, and finally a stakeholder consultation session.

The project's commissioning organization, the ASC, required an evidence-informed definition of physical literacy appropriate for the Australian context, and relevant to all stakeholders across education, health, community sport, and elite sport, to include parents and children. We conducted a bespoke systematic review (ASC, 2017a) of physical literacy concepts, ultimately encompassing 192 papers addressing (a) current work in physical literacy, (b) physical activity, (c) physical education, (d) motor learning and motor development, (e) motivation, (f) confidence, and self-esteem, (g) knowledge and values, and (h) pedagogical and coaching strategies. Papers were coded for evidence quality using the coding system from Phillips et al. (2001). The conclusions of this process were as follows: (a) existing papers on physical literacy tended to be opinion and argument based; (b) much stronger quality evidence existed in physical activity and motor learning; (c) many other concepts related to motivation (e.g., determination, willpower, passion) and confidence (e.g., self-esteem, perceived competence, self-efficacy)—which could be problematic when positioning these terms centrally within the existing definition; (d) "knowledge and values" appeared to be extremely hard to define and conceptualize; (e) motivation, confidence, and knowledge do not progress linearly with age/development, with significant implications for a resulting standards framework (i.e., normative/prescriptive standards would not be consistent with that evidence base); and (f) there had been a recent movement in definitions, or published resources, toward addressing the physical, affective, cognitive, and social domains of learning.

Upon completion of the literature review, which represented a key project deliverable, the three principal investigators worked with the ASC stakeholders to generate a list of key concepts to be evaluated by the expert panel in the first Delphi survey. The discussion sought to ensure that all key considerations from the review were included, without overburdening the panel or creating redundancy by separately listing closely related terms. The first round of Delphi survey took place following the process of identifying the list of concepts related to physical literacy (see Table 2). Surveys were e-mailed to the whole 18-member panel, offering 2 weeks to respond. Each respondent was asked to indicate on a scale of 0–10 the extent to which each concept was (a) core to physical literacy, (b) a component/construct of physical literacy, (c) an antecedent/contributor to physical literacy, (d) a consequence of physical literacy, and (e) an aspect of the underpinning philosophy. Table 2 summarizes the scores provided by experts regarding each concept that was found through the systematic literature review to be most commonly associated with physical literacy. The strong prevalence of "cross-loading," where concepts were recognized under multiple themes, necessitated opening the process for discussion and debate in order to pursue consensus.

One week after the first Delphi survey was completed and results summarized, a live 1-day workshop was conducted in Sydney. The participants were presented with key conclusions, and a summary of the results from the first Delphi survey. After this presentation, debate was facilitated regarding the best ways to proceed. The panel reached initial agreement to consider several defining statements as opposed to an individual definition attempting to encompass all aspects of physical literacy. Initial wordings for three defining statements were drafted within the workshop, ready for feedback in the subsequent survey. Likewise, it was agreed to explore the potential of offering bespoke "tailored" definitions to each different stakeholder group. Clear concerns were recorded that the proposed products did not heavily emphasize participation in physical activity and the avoidance of sedentary lifestyles.

The primary purpose of the second round of Delphi survey was to seek consensus and/or feedback on the initial proposal of defining statements. Each of the three proposed defining statements were evaluated on a 5-point Likert scale anchored at "*strongly disapprove*" versus "*strongly approve*," as well as open text responses for suggested revisions, clarifications, or concerns. Additionally, experts were asked to evaluate the applicability of each defining statement to different stakeholders, to include teachers, coaches, parents, policy-makers, children, and researchers. Each of the three defining statements presented achieved between 62% and 77% agreement, and thus, failed to reach consensus. Concerns were expressed that these statements did not allude to a desirable state or level for attaining health benefits, and/or participating fruitfully in society. Likewise, some respondents still questioned, "What is wrong with the old definition?" Regarding the inclusion of both "movement" and "physical activity," there were two clear arguments regarding wording choice, which indicated that different readers tended to interpret the two terms differently, depending on their standpoint. First, typically voiced by the panel's physical activity promotion experts, was the argument that "all movement is physical activity," but it was also noted that, for many of the panel, physical activity was associated with "health-promoting" moderate-to-vigorous physical activity (discounting many forms of movement). By contrast, the education experts in the group typically viewed "movement" as the most suitable term to use, but the physical activity researchers felt that this did not sufficiently emphasize health-promoting physical activity. The only resolution that was deemed acceptable to all, in order to reach consensus, was to include both terms. Furthermore, to adequately capture the difference between process and outcome interpretations, a fourth defining statement was recommended.

Given the fact that the 80% consensus criterion score was not met after the second round of the Delphi survey, a third round was needed. The third-round survey included the three revised defining

Table 2 Summary of the Panel's Initial Ratings of the Strength of Relationship Between Concepts and Aspects of Physical Literacy

Concept	Core	Construct	Antecedent	Consequence	Philosophy
Competence	7.8	8.2	5.7	5.4	
Confidence	7.60	8.00	6.50	6.00	
Occurring across whole lifespan	7.50	5.80		6.00	
Human movement	6.80	5.80			
Motivation toward PA	6.70	7.00	6.70	7.30	
Physical movement	6.40	6.50	6.70	7.90	
Inclusive	6.2				6.5
Lifelong disposition to PA	6.10			7.00	
Holistic	6.1				7.2
Knowledge and attitudes	5.80	7.00	6.60	6.90	
Whole person	5.80				7.10
Perceptions of physical competence	5.40	7.50	6.60	5.90	
Learning	5.30			5.10	
Integrated	5.2				5.9
Physical fitness		7.00	5.40	8.30	
Physical self-perceptions		6.90	5.60	7.20	
Fundamental movement skills		6.30	5.40	7.30	
Physical education			6.50		
Pedagogy			5.90		
Occurring in childhood and adolescence			4.90		
Sport participation				8.50	
Meeting PA guidelines				8.30	
Health outcomes				7.80	
Health behaviors				7.60	
Meeting SB guidelines				7.30	
Mental health				6.70	
Sporting success				5.70	
Embodied					6.50
Existentialism					5.60
Phenomenology					5.60

Note. Only means ≥5 are shown. PA = physical activity; SB = sedentary behavior.

statements and a fourth describing the aspiration to be pursued. Once again, the respondents were given opportunity to respond to the redrafted proposal of defining statements, with open text for suggested revisions, clarifications, or concerns. Advice was sought regarding stakeholder-specific phrasings to be included in an accompanying explanatory document. Consensus was achieved in round three (>80%) regarding the four defining statements. Furthermore, an accompanying explanatory document was viewed as a suitable way of explaining the concept to diverse user groups.

As the final step of Phase 1, stakeholder consultation was conducted by staff from the ASC, requesting feedback from internal and external user groups (ASC, sport sector, education sector, and community groups). Staff from the ASC were autonomous in this process and engaged a wide variety of potential stakeholders through meetings, teleconferencing, e-mail, and in workshops. They provided feedback to the panel that user groups did not engage with the word "affective" (under "Constitution"), and that "psychological" should be used instead. Panel members were contacted for comment. There was no objection from panel members. Final wording was agreed (see "Results" section).

Phase 2. Phase 2 of the study, developing a standards framework, included six steps. The study began with a review of curricula and standards documents, and a subsequent session to establish a framework for progression/development. Next, the second 1-day workshop took place followed by the first round of Delphi survey, the second round of Delphi survey, and finally a stakeholder consultation session.

To begin Phase 2, the principal investigators conducted an initial sampling of curricula and standards documents, incorporating all available national curricula and standards documents already in use within Australian Education and National Sporting Organizations. Contents were extracted from the following: (a) ACARA Physical Education Curriculum; (b) Australian Early Years Curriculum; (c) The Australian General Capabilities Curriculum; (d) The New South Wales Physical Literacy Continuum; (d) Swimming Australia Standards; (e) Surf-Lifesaving Australia Standards; (f) Cycling Australia Standards; and (g) ASC Talent Pathway Documents (FTEM = Foundations-Talent-Elite-Mastery). An inductive thematic analysis of learning phases and expectations in different domains was conducted (physical, psychological,

cognitive, and social), maintaining a traceable audit-trail back to original documents (legacy documents containing each draft are available from first author on request). Evidence from the systematic review (Phase 1) suggested that linking levels or expectations to age would be inappropriate and not reconcilable with current evidence—particularly regarding aspects of psychosocial development.

Following this initial sampling and inductive thematic analysis, an initial framework was created for describing progression/development that was not based on age or normative, linear progressions. In collaboration with the education experts within the group, the System of Observed Learning Outcomes (SOLO; Biggs & Collis, 1982) was proposed as a way of structuring the progressions within the standards. The aforementioned inductive analysis of expectations and competencies was mapped onto SOLO taxonomy learning stages. This initial draft was then prepared to be presented to the panel at the second live workshop.

The second live workshop, conducted in Melbourne, began by introducing the panel to the aims, key considerations, and critical issues in developing the standards framework. The panel members were presented with a review of the project to date, and key current issues for feedback and resolution, including (a) the contents of the standards, (b) specific suggested wordings, and (c) the arrangement of the standards into a 4 × 4 matrix (four levels of progression informed by SOLO taxonomy, and four domains, namely, physical, psychological, cognitive, and social). The panel worked in groups to offer written feedback directly onto printed samples of the draft standard. As a result of these processes, the panel (a) offered initial support for the use of the SOLO taxonomy to structure the levels/progressions within the standard; (b) offered initial support for the standard addressing all four learning domains: physical; psychological; cognitive, and social; (c) recommended that descriptors are worded in the form of "I" statements, for self-evaluation (for example, "I can . . . ," "I do . . . ," "I am able to . . . "); (d) strongly recommended including a fifth learning level describing the initial, as yet unfulfilled, potential to learn. This recommendation was agreed as it would be more inclusive of all ages and ability levels, as well as already being specified within the SOLO learning taxonomy.

Once the recommendations and feedback from the live workshop had been incorporated into a revised draft standard, a Delphi survey was initiated, seeking either consensus or further constructive feedback. Consensus was sought regarding (a) the use of four learning domains to characterize physical literacy, (b) the use of the SOLO taxonomy to capture learning levels, (c) the labels/descriptors to use for each learning progression/level, and (d) progressions. Consensus was sought using three response choices: agree, agree with suggestions, and disagree with reason and alternative. Consensus was reached regarding the questions statements as follows: (a) "I agree with the use of the four learning domains as a way to structure the standards" (89%); (b) "I agree with the use of the SOLO taxonomy as a way to portray the learning of physical literacy" (94%); (c) "I agree with the group/label names across the top of the standards document" (89%); and (d) "I agree that the levels within the standards should not have age or grades specified" (89%).

While >80% consensus was achieved in this round, valid comments and suggestions were made that prompted a final round of panel feedback. Hence, in the final round of Delphi survey, suggestions from the panel were incorporated and resubmitted for feedback and consensus. Specifically, feedback was sought regarding the use of an analogy with the periodic table—of chemical elements to create a visual model to accompany the proposed standards. Upon reviewing sample materials and a written explanation, consensus was reached using the following statement: "I agree with the use of a periodic table metaphor to support and explain the physical literacy standards" (82%). Furthermore, consensus was maintained regarding the following statements: (a) "I agree with the use of the four domains in the visual model for physical literacy" (82%); and (b) "I agree with the use of the SOLO taxonomy as a way to portray the levels of each element in the visual model" (82%).

With both a set of defining statements and a standards framework and visual model, a large practitioner workshop was held in Melbourne, with attendees from all the listed stakeholder groups comprising over 50 participants. In a daylong workshop arranged and facilitated by ASC staff, the draft project outcomes were presented to stakeholders from community and elite sport and education sectors. Groups were arranged according to user-group, with researchers, educators, community sport, elite sport, and policy-makers typically seated together in their respective groups. Each group provided feedback on worked up samples of the standards documents, along with the opportunity for further feedback to be provided electronically during and following the workshop. ASC staff collated and reviewed the stakeholder feedback, which was used to inform wording updates and clarifications to the standard. Feedback highlighted perceived tensions between the standard and the contexts in which it will operate, including alignment with existing frameworks (e.g., curriculum); linear versus nonlinear progression; and questions over who has a role in determining what/how/when young people learn. It was recommended that the standard prioritize local end users (e.g., coaches, teachers, parents) to support progression from theory to practice. As the final products were developed from academic outputs into branded materials and resources, additional consultation was undertaken by the ASC with relevant stakeholders. These inputs helped to emphasize the alignment with existing frameworks and to provide appropriate advice regarding implementation issues (e.g., expectations for delivery, nonlinear progressions).

Results

Through processes detailed in the "Procedure" section, the panel reached consensus that it would require four defining statements to adequately introduce the concept of physical literacy to a new audience, while also taking the opportunity to clarify key aspects of the definition. Note also that the need for new wording was identified by end users, and thus the stakeholder, and this requirement informed the very framing of the study. Informed by a bespoke systematic review of current published papers regarding physical literacy and, importantly, related concepts such as motor development, physical activity participation, motivation, and confidence (ASC, 2017a), the panel members were active and critical participants in a debate and refinement process that led to the following four defining statements:

- *Core:* Physical literacy is lifelong holistic learning acquired and applied in movement and physical activity contexts.
- *Constitution:* 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.
- *Aspiration:* A physically literate person is able to draw on their integrated physical, psychological, cognitive, and social

capacities to support health-promoting and fulfilling movement and physical activity—relative to their situation and context—throughout their lifespan.

It was necessary to achieve consensus regarding the definition, or defining statements, prior to developing a standards framework for understanding physical literacy. As well as reviewing the specific wordings that were proposed in several drafts of the physical literacy standard, the panel were required to reach consensus regarding (a) the use of the four learning domains, suggested in the defining statements, as a way to structure the standards (89% consensus); (b) the learning model/framework to be used (SOLO taxonomy; Biggs, 1989; Biggs & Collis, 1982; Dudley, 2015) as a way to articulate the structure and progression of learning within physical literacy (94% consensus); (c) the group/label names, adapted from the SOLO taxonomy, that were to be used as level descriptors in the standards document (89% consensus); and (d) that the levels within the standards should not have age or grades specified (89% consensus).

To structure the learning progression, acknowledging it would be important to offer nonprescriptive and nonlinear developmental pathways, the group drew on Biggs' SOLO taxonomy (Biggs & Collis, 1982; Biggs & Tang, 2011). In this approach, the unfulfilled capability to learn is represented by a dot (*prestructural*), whereas initial accumulations of experience varying only in small degrees are represented first by a line (*unistructural*—one area/topic/skill), and then several parallel lines (*multistructural*—several areas/topics/skills). While those lines are, of course, linear, there are important additional aspects of learning. For example, when different learnings become connected and compared/mapped, the translation of ideas between them takes place through metaphor, analogy, and ultimately a deeper understanding of the structure of a skill or task (*relational*). Furthermore, there is a level of learning where these rich and connected mental models can be abstracted and used creatively to solve new, novel, and interesting problems that do not follow naturally from what was learned in the more "linear" stage (*extended abstract*). A final Delphi step, in response to feedback from the panel and stakeholders, led to the establishment of a range of "elements"—analogous to chemical elements in the periodic table—with which interested participants could "build" the profiles of movements and activities they wish to engage in. Further details of how this might inform a subsequent measurement/assessment approach is presented by Barnett et al. (2019) within this issue.

Discussion

This paper set out to establish how leading experts in Australia defined and construed physical literacy, by using a modified Delphi methodology. These modifications were enacted with a view to generating a product that was specifically suitable for adoption and implementation by Australian teachers, coaches, parents, children, policy-makers, and researchers alike. To address these challenges, the panel converged on a consensus that avoided "forcing" a simple single definition, and instead resulted in four defining statements. Within these four defining statements, the panel reached consensus that physical literacy is composed of integrated developments and adaptations spanning four learning domains: physical, psychological, cognitive, and social. Hence, this important decision led to the proposal of a standards framework for physical literacy that drew upon all four of these learning domains. Likewise, a set of guidelines was prepared (see Barnett et al., 2019) to clarify the extremely diverse and nonlinear approaches to assessment that are facilitated by the expert panel's consensus exercise. That paper specifically emphasized that approaches to evaluation should not seek normative benchmarks, interpersonal comparisons, or narrow foci on exclusively physical, motor, or fitness criteria. Perhaps the most notable reflection on this process is that developing a definition and standards framework for one context (Australia) generates important new perspectives and insights regarding existing, established approaches.

The defining statements developed through this expert consensus exercise are notably different in their wording from existing definitions at the time of publication, although it is important to emphasize that several groups had sought to clarify that physical literacy comprises integrated development spanning multiple learning domains, including the IPLA (IPLA, 2017). While the IPLA specified physical, affective, and cognitive domains, excluding the social domain, Mandigo, Francis, Lodewyk, and Lopez (2012) included these three plus a social domain. Sport New Zealand (2018) went further, suggesting a spiritual dimension to physical literacy. Likewise, all groups have emphasized that one's development in these domains is "entwined," "codependent," "integrated," and/or "holistic." Ultimately, the expert panel reached the consensus that using wording based on selected, quite Westernized (cf. Evans, 2014; Ward & Quennerstedt, 2015; Williams, 2018), concepts from this wide range of developmental domains—motivation, confidence, competence, and knowledge—may be misleading, and potentially inappropriate, not least when considering aspects of Australia's Indigenous and immigrant cultures. Likewise, the live debates in workshops gradually grew to recognize that while there are already thriving literatures in motor control, physical activity, motivation, and confidence, physical literacy needed to be defined as more than simply the sum of those parts. While the specified literature is relevant and helpful for researching and guiding implementation within physical literacy, other important concepts can be overlooked by focusing too narrowly on the four concepts typically named in the definition of physical literacy. Likewise, important connections between concepts, and emergent properties of systems, could be obfuscated by such a wording. Hence, while different is not always better (cf. Roberts, 2012), we contend that the four defining statements developed by this expert panel may be both more appropriate for conveying the intended meaning of physical literacy and more readily adopted and integrated in the current practices of teachers, coaches, health practitioners, parents, children, and policy-makers.

Further to the discussed changes in wording, a decision was reached by the panel to converge on a series of defining statements, outlining (a) the core of physical literacy—focused on the inherent potential of all humans to learn through physical interaction with the environment; (b) its constitution, based on integrated development spanning the four learning domains of physical, psychological, cognitive, and social; (c) its importance, in that physical literacy helps a person to learn more about the world, become more capable, and ultimately pursue a range of fulfilling activities, as well as the known benefits to health associated with physical activity; and finally (d) the aspiration—describing a configuration, or possibly configurations, of this learning that becomes self-perpetuating, such that the individual persists with physical activity and movement pursuits, and/or reengages following interruptions such as injury, or significant life events. Clearly, literature regarding physical literacy attempts to outline all of these, sometimes within the definition (e.g., " . . . to take responsibility engagement in physical activities for life"; IPLA, 2017), and sometimes in the accompanying text. Following a series of engaging discussions, the

panel members were ultimately satisfied that four transparent and clear statements were more informative and accessible than attempting to convey all these points at once, in a single statement. Furthermore, attempting to convey the core, inherent potential of all humans to learn through physical movement in the same sentence as alluding to the importance of frequent engagement in physical activity for health was viewed as a potential source of tension and contradictions. Two thought experiments were helpful in this regard, both of which were to illustrate conceptual "double dissociations" between physical literacy and (a) meeting the physical activity guidelines, and (b) achieving good motor competence in a given skill or range of skills. Regarding frequent physical activity, the panel members were persuaded that someone who is highly disposed to engage in physical activity and movement pursuits, but temporarily prevented by injury (for example), might demonstrate a more adaptive form of physical literacy than someone who simply sits on an exercise bike at the same intensity for the prescribed 30 min every day, without ever seeking to improve or adapt. Thus, physical literacy could be conceptually distinguished from physical activity. Likewise, a person who has become highly skilled in several motor competencies, but as a result of disengaging and unenjoyable training experiences, may demonstrate a less adaptive profile of physical literacy than someone who struggles to display coordination in kicking, throwing, and catching, but who enjoys engaging in physical activity and finds it fun/rewarding. Hence, motor competence could again be theoretically distinguished from physical literacy, allowing the panel to resolve queries as to whether physical literacy was one and the same with (a) physical activity, and (b) motor competence. The expert panel was satisfied that the concepts/behaviors were highly related, but not the same. Overall, while operating "in the shadow" of preexisting and popular definition wordings, we present these amendments as potential progressions and improvements to how we define physical literacy, particularly with an emphasis on presenting stakeholders with accessible concepts that are less likely to meet resistance when being implemented by such a wide spectrum of "end users" (ASC, 2017b; Kristen, Ivarsson, Parker, & Ziegert, 2015; Macdonald, Abbott, Hunter, Hay, & McCuaig, 2014).

In addition to the aforementioned work on conceptual clarity, which was required to pursue consensus on a definition or defining statements, the group sought to develop a standards framework to support implementation in a variety of settings, including schools, community sport, elite sport, policy-making, research, adult exercise and health settings, and even aged care. To pursue such a framework, the facilitators conducted a thematic content analysis of existing models and theories for physical education, sport development, and physical activity participation. Once a wide range of potential level-descriptors had been amassed, it was necessary to articulate the way such competencies develop/progress—which was problematic once the original, foundational literature review established that physical literacy should not be considered a "linear" trajectory, or articulated using normative expectations (e.g., age-based descriptors). Given the preponderance of existing approaches and frameworks that use age as the key determinant of expectations, ranging from school curricula to the Long Term Athlete Development model (Balyi, Cardinal, Higgs, Norris, & Way, 2006), the panel spent significant time and effort negotiating this issue. Ultimately, the education specialists within the group suggested (and debated) the potential of Biggs' (1989) SOLO taxonomy to structure the learning progression or "journey," on a range from holding the potential to learn to accruing practice in a narrow skill set, before several such learning structures become relatable and comparable, ready to be abstracted and applied in new, diverse, and integrated ways. Under this approach, one may characterize his/her own current profile, or configuration, of physical literacy as anything from simply holding unrealized potential to a thriving and richly interconnected suite of physical activity and movement pursuits. Under this approach, there is no "failure" or "illiteracy," which is compatible with the intentions behind physical literacy thinking (cf. Whitehead, 2001, 2010). Likewise, it was suitably clear that comparing individuals can be problematic, as two learners may be achieving superficially similar profiles, but in entirely different contexts (e.g., in water, on grass, or by climbing mountains).

The outcomes of this study carry many important implications for research, theory, and practice, as well as the important linkages between these often-segregated considerations. It is informative to reflect on the importance of conceptual clarity when presenting a novel concept to audiences who may be hearing it for the first time. The "implementation-ready" emphasis of the current research forced the panel to reflect on this critical issue, and overall there was agreement that seeking to oversimplify into a single statement defining physical literacy held the potential to mislead and disillusion new audiences, and that parsimony should be pursued in the form of clear, transparent statements addressing physical literacy's core, composition, importance, and aspiration. Ultimately, as discussed elsewhere at length, simplicity/parsimony is a highly subjective judgment, and not a reliable guide to validity (Baker, 2003; Sober, 1996). The panel in the present study reflected on previous approaches before agreeing on a viewpoint of "transparency as parsimony," as opposed to "brevity as parsimony." The issue of parsimony and conceptual clarity permeates all of science, from pure research to implementation projects, and two contrasting approaches to parsimony described earlier generate notably different solutions.

For researchers, the current findings carry an important implication; approaches to measurement which depend on linear modeling, averages, and simplistic interpersonal/intergroup comparisons can all be highly problematic in relation to a holistic, complex concept such as physical literacy. The standards framework put forward by this expert panel attempted to emphasize unique and individual profiles that can be characterized at an abstract level (using the SOLO taxonomy), but which are extremely difficult to directly compare and contrast between individuals. Notably, statistical analysis techniques and modeling approaches do exist for analyzing nonlinear data, and the assumptions of simple linear scales do not necessarily need to be applied to data in order to meaningfully interpret, model, and test theories (Ivancevic, Jain, Pattison, & Hariz, 2009; Rattan & Hsieh, 2005). Measuring multiple constructs, frequently over a prolonged time frame, especially with a view to identifying underlying emergent/latent variables, is still quantitative but might be viewed as characterizing and modeling, rather than the commonly conceived one-off "measurement." In fact, given that physical literacy, in the approach offered here, is most closely associated with learning, this characterizing of (nonlinear, complex) changes over time is a much more appropriate way of viewing measurement with respect to physical literacy. Under the framework proposed in this paper, learning curves, rates of change, and conditions facilitating change/learning would all be more useful concepts than simply setting up pre- to- postmeasures of isolated individual variables, averaged across large groups. Hence, as noted earlier, considering how physical literacy may be best applied to a new context may also generate useful insights and reflections regarding existing, established programs.

With respect to applied practice, one important implication of the defining statements and standards framework put forward by this research is that any practitioner's *current practice* can be readily encoded, *as it is*, into the visual model provided. The core of our proposed definition for physical literacy is learning, which more fundamentally means any and all adaptations a person experiences in relation to being physically embodied. Hence, anybody can engage with the *core* defining statement, without needing to worry about achieving a level that is sufficient for health, or even being concerned about whether what they currently do is "right." In fact, only the "aspiration" defining statement describes a configuration (or potential configurations) that may require significant work and development/learning to attain. Likewise, the standards framework that has been generated spans the full range from merely holding potential, through to engaging in rich and diverse, fulfilling movement experiences.

Furthermore, the resulting standards framework makes a point of including four domains of learning, physical, psychological, cognitive, and social, and progressing through the "levels" requires increasing integration of learning between these areas. Hence, as well as allowing any interested party to encode their own, or another learner's physical literacy, regardless of current level, the framework also offers immediate guidance on how to progress in relation to their current stage/phase. In this respect, the products of this Delphi study are presented as highly accessible, inclusive, engaging, and supportive of participation and engagement. Importantly, once a person understands which SOLO stage they are currently demonstrating in a particular skill or area, the next step is also clarified. For example, the first step of learning any skill is to accumulate experience and understand the basics, that is, how force and speed parameters might change in a throwing or kicking movement. From there, the second stage might involve changing the context or type of skill by small degrees so that a suite of relatable skill sets is constructed (i.e., a series of parallel lines); for example, staying with throwing and kicking, using different sized objects, different surfaces, and using instruments such as rackets and bats may be appropriate progressions. Once several "parallel" learning structures have been accumulated, then a learner needs to be encouraged to compare, contrast, relate, and transfer information between them, and this is a difficult set of skills in themselves,

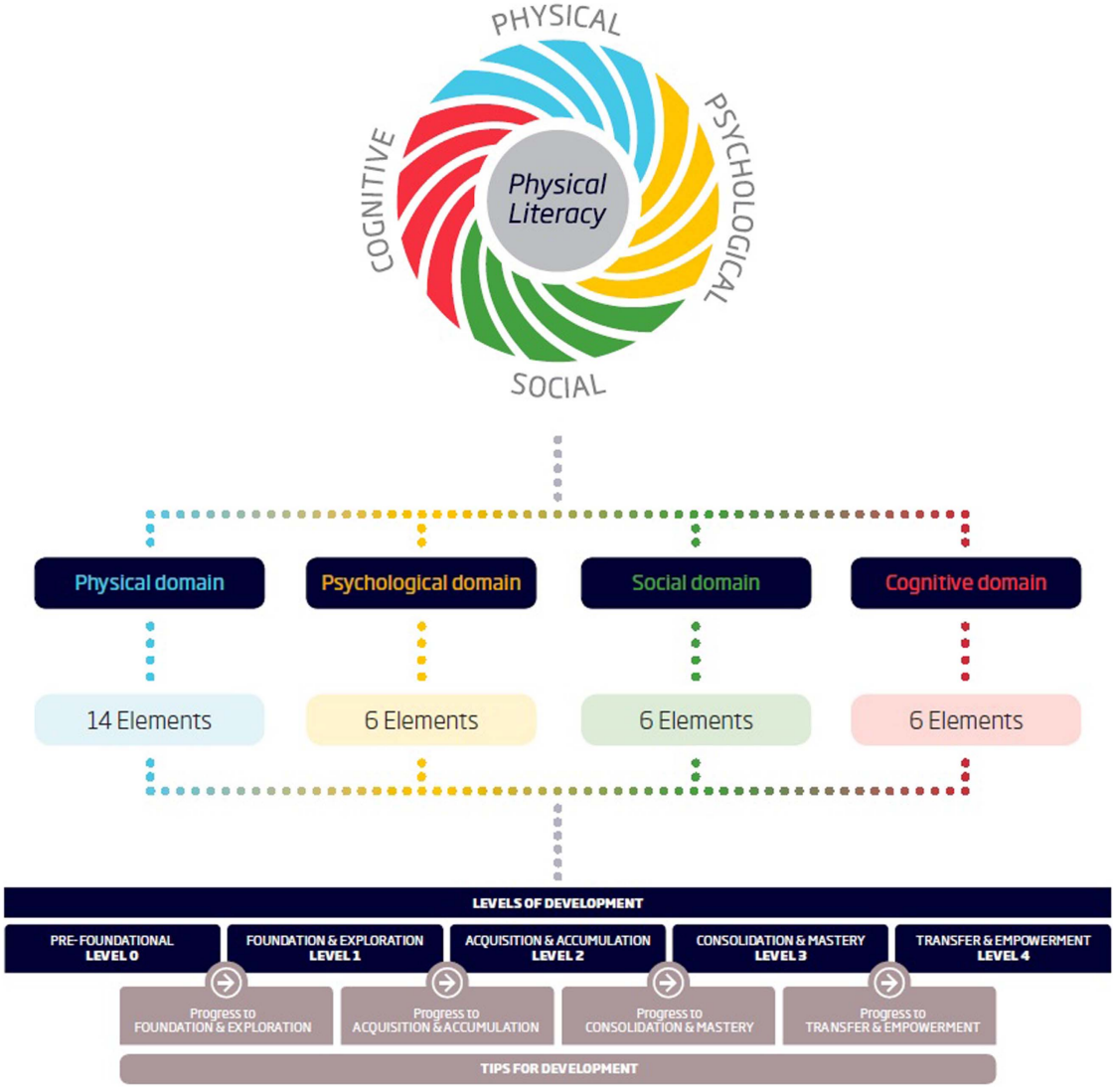


Figure 1 — The resulting standards framework that was reviewed and agreed by the expert panel, deemed to be a suitable "implementation-ready" framework to be recommended for adoption by the stakeholders.

as well as depending on the accumulation of experiences first. Finally, once a learner becomes adept at relating and catalyzing learning between similar (but perhaps, over time, increasingly diverse) skills, then they should be encouraged to transfer and adapt this understanding into new, novel, and challenging environments. The skill of using existing capabilities to solve new and unfamiliar challenges is important, and yet relatively rare compared to those that have preceded in the learning history.

Limitations

This study contained several limitations, not least that the topic area to which we sought to bring clarity had developed several tensions, obfuscations and, despite noble intentions, some philosophical language that appeared to be discouraging the adoption and implementation of physical literacy (Hyndman & Pill, 2017). Consensus from a Delphi process should not be taken to mean that a "correct" answer has necessarily been found, but rather that experts have been engaged in seeking a convergence of opinion and state-of-the-art knowledge (Hsu & Sandford, 2007; Keeney et al., 2011). The products emerging from such a consensus should then be tested and evaluated with a view to establishing their validity and applied utility, as well as being constantly reviewed in relation to evolving best practice. While Delphi methodology has been criticized for forcing consensus, and potentially not allowing panelists to elaborate on their views (Goodman, 1987; Keeney et al., 2011; Pill, 1971), small modifications to the original approach (e.g., the group workshops, stakeholder engagement, and coauthorship model introduced in this study) can still facilitate these important inputs and influences (Keeney et al., 2001). The products developed during this process are presented as holding the potential to at least reduce the inconsistencies and tensions in the physical literacy literature, not only for application within Australia but also with potential implications for other contexts, but that is not to say that these issues are resolved once and for all. There remains scope to assess whether the solutions offered in this paper transfer into other cultures and contexts, or whether they simply add another voice to a crowded debate. As noted previously, it remains impossible to conclusively demonstrate that an ideal panel has been convened, or that additional insight may have been gained by adding new members. Nonetheless, the feedback from panel members, stakeholders, and end users has been reassuring that there is significant added value in the new wording choices and standards framework developed. We also recognize that using a visual model with apparent stages and levels to represent the physical literacy may predispose people to viewing development as linear and normative. With the agreement of the key stakeholders, wording choices within the level-descriptors and accompanying explanatory text (as well as a visual model based on an analogy to the periodic table of elements; see Figures 1 and 2) were used to prevent/minimize such preconceptions from surviving anything beyond a cursory glance at the documents.

Conclusion

Overall, the task of defining and offering a framework for physical literacy has been, and may continue to be, a challenging one for researchers and practitioners around the world. The process followed in Australia for resolving these issues, as well as the products

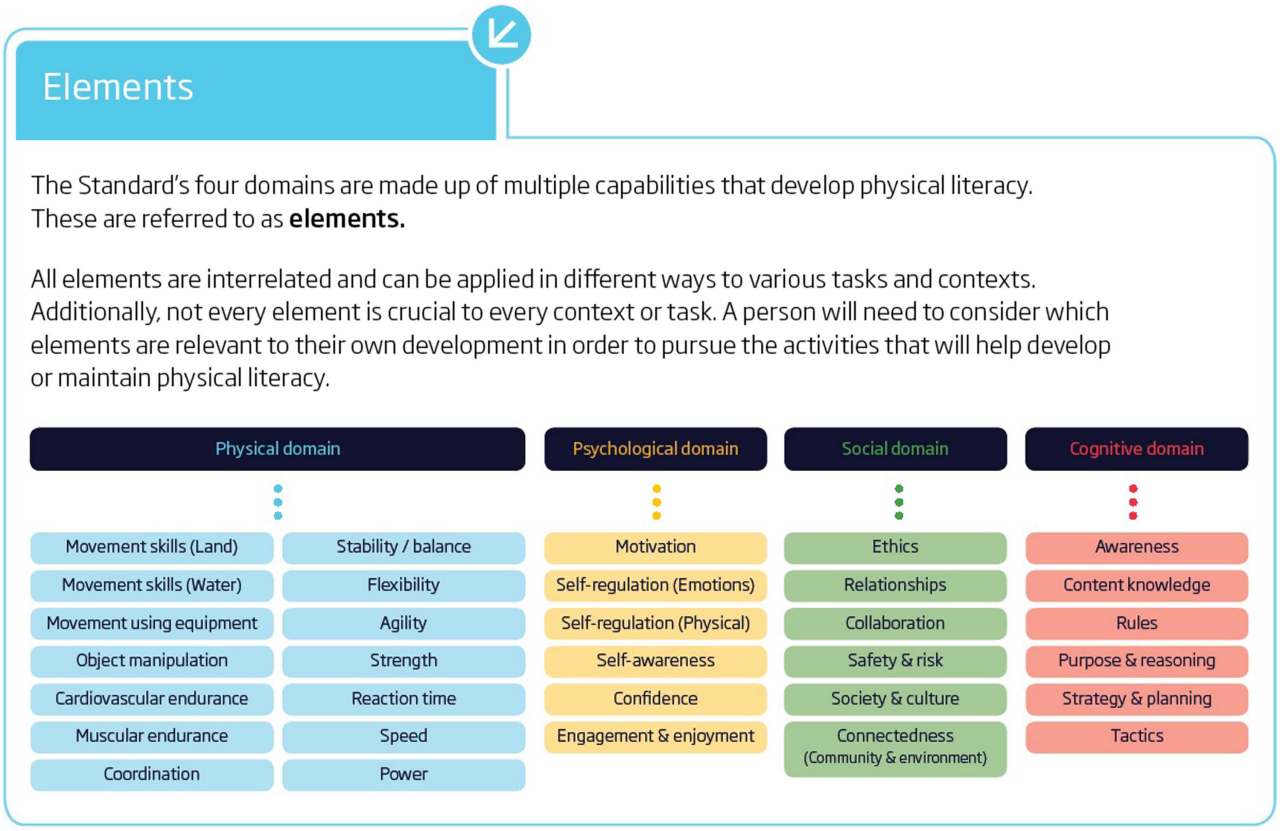


Figure 2 — The resulting physical literacy "elements" that were reviewed and agreed by the expert panel and adopted by the stakeholder.

generated, is presented here as transparently as possible, for review and consideration by a wider audience. We hope that other interested parties, even if they choose to adopt another wording or approach, may benefit from reflecting on the issues faced, and solutions generated, by this project. The most important take-home messages from this study were that (a) it may be helpful to distinguish between two defining statements of physical literacy—the potential held by all humans versus the aspiration to reach a stage where one's physical literacy is self-perpetuating and health-promoting; (b) it is possible to conceptualize a holistic, highly integrated concept such as physical literacy, but that many currently favored measurement approaches can undermine this process; (c) a standards framework based on the SOLO taxonomy of learning was beneficial for characterizing physical literacy informing measurement/assessment, and guiding activity planning according to learner profiles; and (d) it can be beneficial to work closely with stakeholders and commissioning bodies with an emphasis on end-user engagement and utilization. The emphasis of this study was to not simply to create a "correct" formulation, but rather to create a coherent, aligned solution from definition and conceptualization through to products and materials, to promote adoption and engagement. Overall, therefore, the emphasis of this study on creating a contextually sensitive approach for Australia, as well as the emphasis on implementation and stakeholder engagement, has generated both the product described herein and important reflections and insights for future programs seeking to promote physical literacy.

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