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

1   **Abstract**

2   **Purpose.** The development of a physical literacy definition and standards framework suitable for

3   implementation in Australia. **Method.** Modified Delphi methodology. **Results**. Consensus was

4   established on four defining statements: *Core* – Physical literacy is lifelong holistic learning

5   acquired and applied in movement and physical activity contexts; *Composition* – Physical literacy

6   reflects ongoing changes integrating physical, psychological, cognitive and social capabilities;

7   *Importance* – Physical literacy is vital in helping us lead healthy and fulfilling lives through

8   movement and physical activity; *Aspiration* – A physically literate person is able to draw on their

9   integrated physical, psychological, cognitive, and social capacities to support health promoting and

10   fulfilling movement and physical activity, relative to their situation and context, throughout the

11   lifespan. The standards framework addressed four learning domains (physical, psychological,

12   cognitive, and social), spanning five learning configurations/levels. **Conclusion.** The

13   development of a bespoke program for a new context has important implications for both existing

14   and future programs.

15

16   *Keywords:* expert, consensus, physical literacy, policy, education, sport

17

18   **Defining Physical Literacy for Application in Australia: A Modified Delphi Methodology**

19   Physical literacy is a concept that has generated significant interest as a way of addressing

20   the global problems of physical inactivity, and disengagement from physical pursuits (Shearer et

21   al., 2018; Whitehead, Durden-Myers, & Pot, 2018). Sedentary lifestyles remain a significant

22   problem around the world; for example, of the 56 million people who die each year, 3.2 million of

23   those deaths (six people per minute) can be specifically attributed to physical inactivity (World

24   Health Organization, 2014, 2015). The total economic cost of inactivity is estimated to be U.S.

25      $67.5 billion globally (Ding et al., 2016). Physical inactivity is a significant and pervasive threat

26   common to many nations, undermining productivity and growth, and reducing quality of life for

27   millions of people (Ding et al., 2016). Nonetheless, when Metcalf, Henley, and Wilkin (2012)

28   conducted a systematic review and meta-analysis of 30 children's physical activity interventions

29   that used objective outcome measures, they found an average increase of just four minutes per day.

30   This does not instill great confidence in the success, to date, of those interventions that have been

31   used in controlled trials seeking to increase children's physical activity, and may suggest that

32   reformulation of these interventions may be necessary.

33   Physical literacy was proposed (Whitehead, 2001, 2010) as a way of refocusing the existing

34   messaging around physical activity for health, which has often involved avoiding illness and ill-

35   health, a relatively ineffective message for physical activity interventions (Ekkekakis & Zenko,

36   2016; Zenko, Ekkekakis, & Kavetsos, 2016). Likewise, physical literacy was asserted as a

37   counter-argument to the view that all young people need to gain skills to succeed in sport, because

38   only a tiny proportion of children can go on to compete at elite levels of competitive sport,

39   meaning that such a message can be demotivating for those not able to attain this level of

40   proficiency (Côté, Strachan, & Fraser-Thomas, 2008; Fraser-Thomas, Côté, & Deakin, 2008). A

41   key point emphasized by physical literacy literature is that it applies to children and adults,

42   throughout all stages of life (Whitehead, 2001). The most prominent definition of physical

43   literacy, as advocated by the International Physical Literacy Association (IPLA) is "the motivation,

44   confidence, physical competence, and knowledge and understanding to value and engage in

45   physical activity for life" (IPLA, 2017), which represents the necessary attributes and

46   predispositions to engage in health-promoting physical activity throughout life. Hence, to many,

47   the philosophy of physical literacy and its underpinning concepts offers a way forward in the

48   attempt to address the global problem of insufficient physical activity (Jurbala, 2015; Lundvall,

49   2015). Notably, Whitehead (2010) proposed that physical literacy may need to be interpreted and

50   articulated differently in diverse cultures and countries (Sport New Zealand, 2018). Australia has

51   its own unique history and traditions from both Indigenous cultures and subsequent colonization,

52   as well as a unique arrangement of federal and state governments, governing bodies and regulatory

53   agencies (Keegan, Dudley, & Barnett, in press). As such, and in recognition of the need to be

54   contextually sensitive, this research sought to develop a definition and standards framework for

55   physical literacy that would be appropriate for Australia. Importantly, however, the development

56   of such resources for one country may still have relevance and implications for other physical

57   literacy initiatives around the world.

58   While the concept's roots trace back many decades (Whitehead, 2001, 2010), researchers

59   and practitioners in health, physical education, sporting participation, and recreational movement

60   pursuits have embraced physical literacy as a new paradigm for understanding the roots of

61   behaviors across diverse contexts (Jurbala, 2015; Longmuir & Tremblay, 2016; Lundvall, 2015).

62   Researchers, policy-makers, teachers, and coaches have all engaged with programs promoting

63   physical literacy, in many countries (e.g., Australian Sports Commission [ASC], 2017a; Spengler

64   & Cohen, 2015). In addition to the above definition, however, physical literacy literature speaks to

65   the physical embodiment of human existence, and the inherent physical movement that permeates

66   all human experiences. But, this alone does not constitute a full definition (Hardman, 2008).

67   Rather, physical literacy was proposed to invoke "a holistic engagement that encompasses physical

68   capacities embedded in perception, experience, memory, anticipation and decision making"

69   (Whitehead, 2001, p. 131). Hence, physical literacy refers to *both* the potential to engage with,

70   and learn from, our physical embodiment *as well as* a configuration of this learning whereby the

71   individual becomes sufficiently competent and predisposed to always engage in health-promoting

72   movement pursuits. This simultaneous invocation of two meanings has led to significant debate

73   and dissatisfaction (Cairney, Bedard, Dudley, & Kreillaars, 2016; Edwards, Bryant, Keegan,

74   Morgan, & Jones, 2017; Hyndman & Pill, 2017; Jurbala, 2015). In fact, one significant barrier to

75   physical literacy realizing its potential is the diverse, sometimes conflicting, definitions that

76   different groups adopt for physical literacy (Shearer et al., 2018). This situation has been critiqued

77   as causing confusion and conflict, and even for being too divergent from Whitehead's 'original'

78   intended meaning (Hyndman & Pill, 2017; Pot, Whitehead, & Durden-Myers, 2018; Robinson,

79   Randall, & Barrett, 2018); but of course, simply because a concept has been formulated before

80   does not prevent other researchers from exploring and testing that formulation, or from seeking

81   approaches that are more suitable to a specific local context (e.g., Whitehead, 2010). Recent

82   systematic reviews (Edwards et al., 2017; Edwards, Bryant, Keegan, Morgan, & Jones, 2018) and

83   narrative overviews (Green, Roberts, Sheehan, & Keegan, 2018; Shearer et al., 2018) have

84   analyzed and compared the differing approaches to conceptualizing and operationalizing physical

85   literacy. These reviews note that while adopting different approaches, most researchers and

86   practitioners promoting physical literacy agree regarding the underpinning formulation of a holistic

87 concept, and the importance of adopting an approach that emphasizes holistic benefits instead of

88 separately pursuing health benefits, skill development, or competitive success. As such, this study

89 sought to develop a definition and framework for physical literacy that was both coherent and

90 philosophically aligned, and specifically developed to be ready-for-implementation by Australian

91 teachers, practitioners, policy-makers, and researchers alike.

92 When it comes to deciding which approach to adopt for the promotion of physical literacy in

93 a new setting, organizations may either simply adopt one of the approaches from another context,

94 relatively intact, or seek to develop a local, contextually sensitive framework (cf. Whitehead,

95 2010). On one hand, several groups have argued for the adoption of a single, agreed definition and

96 framework, *a priori*, to avoid confusion as described by Shearer et al. (2018). On the other hand,

97 Edwards et al. (2017, 2018) argued that such a decision would not allow for the necessary

98 scholarly debate and conceptual development to occur, and that research demands a degree of

99 pluralism in order for concepts to be compared and evaluated over time (Feyerabend, 1975;

100 Lakatos, 1970). Over time, researchers who clearly articulate the specific definition and

101 underpinning assumptions that their physical literacy program adopts would facilitate the

102 comparison of which approaches generate which outcomes (Edwards et al., 2017, 2018). The main

103 problem for this approach of 'tolerating diversity' is that, in the short term, it does not help

104 groups/agencies seeking to make evidence-based decisions about how best to implement a large-

105 scale (e.g., nationwide) physical literacy initiative. Without the necessary time and resources to

106 wait for a resolution to emerge, a third option for those looking to implement physical literacy

107 initiatives (as was the case here) would be to develop and evaluate a custom-designed, evidence-

108 informed framework, in collaboration with key stakeholders and practitioners, with its own clearly

109 defined assumptions and principles. This third method ensures that the resulting approach is

110   sensitive to local cultural and practical considerations, while also offering another perspective from

111   which to compare and evaluate existing programs, thus informing the scientific discourse

112   (Feyerabend, 1975; Lakatos, 1970).

113   As this research was associated with a national implementation project, the resulting

114   definition and framework had to be amenable with immediate adoption and implementation in

115   Australian schools, community sport settings, elite sport, research, and policy-making contexts,

116   spanning federal and state governments, and education, health, and sports departments. We set out

117   to develop a new definition and framework for physical literacy that: (a) was aligned with current

118   usage, expectations, and intentions for the physical literacy concept; (b) was clear, understandable,

119   and internally consistent; (c) included defined concepts, that could be progressed and differentiated

120   from initial learning through to high-order skills and attributes; (d) built upon the strengths of, and

121   lessons from, current practice and existing systems worldwide; (e) was informed by programs in

122   other counties, including Canada, the United Kingdom, New Zealand, and the US; (f) was

123   specifically sensitive and appropriate to the Australian context; (g) was aligned to schools, sporting

124   organizations, and family contexts; and (h) was evidence-informed – that is, compatible with, and

125   responsive to, existing research evidence (cf. Nelson & Campbell, 2017; Nevo & Slonim-Nevo,

126   2011).

127   These considerations were addressed by deploying a Delphi methodology, drawing on the

128   expertise of leading Australian researchers and practitioners, with the guidance of international

129   colleagues. Our research question was simply, how do leading experts in Australia – supported by

130   international partners – define and construe physical literacy?

131

132   **Method**

133   **Participants**

134   The Delphi method does not use a randomly sampled group, but rather experts are

135   purposively targeted, after being identified by the research team prior to data collection (Hsu &

136   Sandford, 2007). The selection of such experts can be problematic, as both the criteria to qualify

137   as an expert and, in this case, the nature of the subject matter, can be poorly defined (Hsu &

138   Sandford, 2007; Keeney, Hasson, & McKenna, 2011). Our selection process was informed by: (a)

139   our preceding literature search (cf. Hasson, Keeney, & McKenna, 2000; Hsu & Sandford, 2007;

140   Keeney et al., 2011); (b) geographical constraints (i.e., chiefly those working and living in

141   Australia, with advice also sought from outside Australia for triangulation purposes); and (c)

142   consideration of all the previously listed focus areas, including schools/education, community

143   sport, youth sport, elite sport, health promotion, disability sport, and Indigenous sport/physical

144   activity. Therefore, individuals were considered to be eligible to participate if they had related

145   backgrounds and experiences concerning the target issue (cf. Pill, 1971) as well as a vested

146   interest in promoting physical activity, physical education, sport participation, or sporting

147   performance. We did not begin Round 1 of the study until we had agreement from the three

148   principal investigators and the project's key stakeholder (Australian Sports Commission) that all

149   the required backgrounds and skill-sets were contained within our panel. Delbecq, Van de Ven,

150   and Gustafson (1975) suggested 10 to 15 panelists may be a workable panel size, to balance

151   containing sufficiently diverse expertise against the likelihood of increased debate, and thus time

152   impost, for the participants. Including the three principal investigators, our panel contained 18

153   participants, as detailed in Table 1. The project was approved by the Human Research Ethics

154   Committees of the University of Canberra (HREC16-162) and Deakin University (2016-272).

155   **Facilitation of Workshops and Surveys**

156   The face-to-face workshops were facilitated using Microsoft PowerPoint, along with

157   stationery such as large sheets of paper, sticky notes, and board pens. On both occasions, the

158   content of the introductory presentations was derived from the preceding literature review (ASC,

159   2017a). Some panel members opted to be linked into the meetings via Skype teleconferencing.

160   The online survey was administered through Qualtrics survey software, and then exported into

161   Microsoft Excel for analysis.

162   **Design**

163   The Delphi technique is an iterative process, designed to combine expert opinion, in order

164   to arrive at a group consensus (Hsu & Sandford, 2007; Keeney et al., 2011). The original method

165   used a series of intensive surveys which were interspersed with controlled feedback (Dalkey &

166   Helmer, 1963). The process was designed to develop through multiple stages, with each building

167   upon the last, until an acceptable level of consensus was reached (Sumsion, 1998). To catalyze

168   this process, our modification to the standard Delphi methodology was to conduct, present, and

169   discuss a critical review of the literature on physical literacy, which we presented at a one-day

170   workshop in Sydney as part of the first phase of the study. Likewise, the second phase of the

171   research was initiated through a group workshop in Melbourne. Each survey round was

172   subsequently designed in light of the responses collected, with feedback and reflections from each

173   survey feeding into the next. There were two phases to this study to address first the definition and

174   then the standards. Each phase used the same expert panel members and comprised three formal

175   survey rounds and one live workshop. In subsequent survey rounds, the panel members were

176   provided with their own anonymized responses to the previous round, as well as a summary report

177   of that round containing the group's anonymized responses. This aspect of the Delphi

178   methodology was designed to provide the panelists with the option of reconsidering their original

179   response. Typically, the Delphi process continues for three rounds, or until consensus is obtained

180   (Keeney et al., 2011). Delphi studies contain several key considerations, each of which are now

181   introduced as applied to the current study.

182   **Consensus requirements.** Consensus is typically defined as agreement among 75% of the

183   panel (Francis et al., 2016; Hasson et al., 2000; Hsu & Sandford, 2007). In this study, 80% was the

184   agreed target for consensus.

185   **Questionnaire design.** Each round of survey questions, and their scoring options (e.g.,

186   Likert scale, yes/no, agree/disagree) were discussed and agreed between the core team and the key

187   stakeholder before being distributed. The contents of each survey round are available on request

188   from the first author.

189   **Number of rounds.** The Delphi method requires a minimum of two rounds (three if round

190   one is open-ended). Beyond that, the number of rounds is disputed. Walker and Selfe (1996)

191   noted that repeated rounds may lead to fatigue by respondents and increased participant attrition.

192   We used the face-to-face group workshops (see Procedure section) to expedite this process,

193   identifying key tensions and issues at these workshops before feeding those key questions into the

194   online survey rounds (cf. Butterwick, Paskevich, Lagumen, Vallevand, & Lafave, 2006; Graefe &

195   Armstrong, 2011; Lafave, Butterwick, Murray, Freeman, & Lau, 2013; Lafave, Katz, &

196   Butterwick, 2008).

197   **Feedback.** We presented survey comments, anonymized, to subsequent rounds of the

198   Delphi with draft responses and reflections where required, tracing how these comments had

199   influenced the development of redrafted statements. Comments and debates made in the live

200   workshops were not anonymous, nor were they formally recorded, but these sessions played an

201   important role in facilitating rapid progression of ideas, as well as establishing a constructive and

202   collaborative tone to the process.

203   **Maintaining engagement and reliability/validity of responses.** Due to the multiple-

204   round process, the reliability and validity of the findings may be at risk if response rates drop

205   during the study. For example, if the consensus reflects only the opinion of those who persisted till

206   the end. For this reason, participant motivation is critical (Hasson et al., 2000) and we addressed

207   this by including a selection criterion of experts with a vested interest in contributing to this topic.

208   In addition, we offered panel members the opportunity to become co-authors on any final

209   publication generated by the study, regardless of whether they agreed with the final outcomes or

210   not. We also set a stringent criterion of 80% consensus for the final product(s).

211   **Anonymity of panel members.** Anonymity is proposed to facilitate the provision of open

212   and honest views, as well as facilitating the updating or changing of opinions during the process

213   (Keeney, Hassen, & McKenna 2001). Anonymity was maintained during the survey rounds of the

214   process, providing panelists with a reasonable chance to reflect on and respond to questions,

215   without being influenced by knowing the identities behind other comments/inputs (Goodman,

216   1987). Responses were tallied so that each opinion carried the same weighting and importance in

217   the analysis (Keeney et al., 2001). Given that the panel members, all experts in related areas, were

218   likely to know one another, anonymity could not be guaranteed. Likewise, if a panel member

219   passionately argued a particular position in the face-to-face workshops, and made the same points,

220   or used similar language, in the surveys, it may undermine their anonymity. Anonymity is chiefly

221   sought in order to facilitate open and honest responses from panel members, and there is little to

222   prevent a passionate or outspoken member of any Delphi from waiving their anonymity. In this

223   case, the diversity of responses suggested that the mixed approach (group workshops followed by

224   anonymous surveys) facilitated a full range of perspectives from different stakeholders, as well as

225   expediting a process that may otherwise have over-run, relative to the time-requirements of the

226   funding organization. The use of group workshops is not unprecedented, and has been advocated

227   as promoting a collaborative approach, and even leading to stronger outcomes (Butterwick et al.,

228   2006; Lafave et al., 2013; Lafave et al., 2008).

229   **Modifications to the traditional Delphi Process.** The inclusion of initial and mid-point

230   face-to-face workshops was not a component of the original Delphi method, developed by Dalkey

231   and Helmer (1963). Rather, it was adopted from the modified Ebel procedure (Butterwick et al.,

232   2006; Lafave et al., 2013; Lafave et al., 2008). The modified Delphi method was chosen because it

233   encouraged expert interaction, allowing members of the panel to provide further clarification on

234   some matters and present arguments in order to justify their viewpoints. Importantly, key

235   decisions leading to consensus (or otherwise) were still conducted anonymously using an online

236   survey. Studies have demonstrated that the modified Delphi method can be superior to the original

237   Delphi method, and perceived as highly cooperative and effective (e.g., Graefe & Armstrong,

238   2011).

239   **Procedure**

240   Two phases of data collection were undertaken, with the second dependent on the outcomes

241   of the first. These two phases of the study focused on first, defining physical literacy for the

242   Australian audience (ultimately using a series of defining statements), and second, developing an

243   evidence-informed standards framework. For the development of key conceptual issues and the

244   definition, information was compiled from a substantive literature review, which was completed

245   prior to the initiation of the Delphi process (as described above). Once the initial key problems and

246   issues were presented to the panel in the first workshop, the first round of Delphi feedback served

247   as a foundation of current opinions, from which progress could be sought. Merely reflecting the

248   initial disagreements or tensions between viewpoints would not have progressed the process

249   towards consensus. Instead, debate was encouraged in the first one-day workshop, after which

250   resolutions to key issues were developed. For example, the panel debated and discussed the

251   tension between whether physical literacy is a process or an end-state/outcome, and whether it is

252   simply defined by its associated concepts and behaviors (physical activity, motivation, motor

253   competence, confidence, positive health outcomes, etc.) or is a separable concept in itself. Live,

254   interactive discussions were *necessary* for these issues to be debated and resolved to the panel's

255   satisfaction (i.e., >80% consensus). For the subsequent development of a standards framework,

256   key overarching issues requiring consensus were developed, before being submitted to the expert

257   panel for anonymous review, feedback, and consensus-seeking. Additionally, however, the panel

258   was invited to review the wordings of specific level-descriptors and statements within the

259   developing product, and wherever possible this feedback was implemented, either to one specific

260   statement or considered in relation to a number of similar/related statements.

261   **Phase One and Phase Two**

262   **Phase One.** Phase one of the study, developing an evidence-informed definition of physical

263   literacy, included six steps. The study began with a systematic review of the literature on physical

264   literacy, and was followed by the first round of Delphi survey, the first one-day workshop, the

265   second round of Delphi survey, the third round of Delphi survey, and finally a stakeholder

266   consultation session.

267   The project's commissioning organization, the Australian Sports Commission, required an

268   evidence-informed definition of physical literacy appropriate for the Australian context, and

269   relevant to all stakeholders across education, health, community sport, and elite sport, to include

270   parents and children. We conducted a bespoke systematic review (ASC, 2017a) of physical

271   literacy concepts, ultimately encompassing 192 papers addressing (a) current work in physical

272   literacy, (b) physical activity, (c) physical education, (d) motor learning and motor development,

273   (e) motivation, (f) confidence, and self-esteem, (g) knowledge and values, and (h) pedagogical and

274   coaching strategies. Papers were coded for evidence quality using the coding system from Phillips

275   et al. (2001). The conclusions of this process were that: (a) existing papers on physical literacy

276   tended to be opinion and argument-based; (b) much stronger quality evidence existed in physical

277   activity and motor learning; (c) many other concepts related to motivation (e.g., determination,

278   will-power, passion etc.) and confidence (e.g., self-esteem, perceived competence, self-efficacy) –

279   which could be problematic when positioning these terms centrally within the existing definition;

280   (d) 'knowledge and values' appeared to be extremely hard to define and conceptualize; (e)

281   motivation, confidence and knowledge do not progress linearly with age/development, with

282   significant implications for a resulting standards framework (i.e., normative/prescriptive standards

283   would not be consistent with that evidence-base); and (f) there had been a recent movement in

284   definitions, or published resources, towards addressing the physical, affective, cognitive, and social

285   domains of learning.

286   Upon completion of the literature review, which represented a key project deliverable, the

287   three principal investigators worked with the ASC stakeholders to generate a list of key concepts to

288   be evaluated by the expert panel in the first Delphi survey. The discussion sought to ensure that all

289   key considerations from the review were included, without overburdening the panel or creating

290   redundancy by separately listing closely related terms. The first round of Delphi survey took place

291   following the process of identifying the list of concepts related to physical literacy (see Table 2).

292   Surveys were emailed to the whole eighteen-member panel, offering two weeks to respond. Each

293   respondent was asked to indicate on a scale of 0–10 the extent to which each concept was: (a) core

294   to physical literacy, (b) a component/construct of physical literacy, (c) an antecedent/contributor to

295   physical literacy, (d) a consequence of physical literacy, and (e) an aspect of the underpinning

296   philosophy. Table 2 summarizes the scores provided by experts regarding each concept that was

297   found through the systematic literature review to be most commonly associated with physical

298   literacy. The strong prevalence of 'cross-loading,' where concepts were recognised under multiple

299   themes, necessitated opening the process for discussion and debate in order to pursue consensus.

300   One week after the first Delphi survey was completed and results summarized, a live one-

301   day workshop was conducted in Sydney. The participants were presented with key conclusions,

302   and a summary of the results from the first Delphi survey. After this presentation, debate was

303   facilitated regarding the best ways to proceed. The panel reached initial agreement to consider

304   several defining statements as opposed to an individual definition attempting to encompass all

305   aspects of physical literacy. Initial wordings for three defining statements were drafted within the

306   workshop, ready for feedback in the subsequent survey. Likewise, it was agreed to explore the

307   potential of offering bespoke 'tailored' definitions to each different stakeholder group. Clear

308   concerns were recorded that the proposed products did not heavily emphasize participation in

309   physical activity and the avoidance of sedentary lifestyles.

310   The primary purpose of the second round of Delphi survey was to seek consensus and/or

311   feedback on the initial proposal of defining statements. Each of the three proposed defining

312   statements were evaluated on a five-point Likert scale anchored at 'strongly disapprove' versus

313   'strongly approve,' as well as open text responses for suggested revisions, clarifications, or

314   concerns. Additionally, experts were asked to evaluate the applicability of each defining statement

315   to different stakeholders, to include teachers, coaches, parents, policymakers, children, and

316   researchers. Each of the three defining statements presented achieved between 62-77% agreement,

317   and thus failed to reach consensus. Concerns were expressed that these statements did not allude

318   to a desirable state or level for attaining health benefits, and/or participating fruitfully in society.

319   Likewise, some respondents still questioned, 'What is wrong with the old definition?' Regarding

320   the inclusion of both 'movement' and 'physical activity,' there were two clear arguments regarding

321   wording choice, which indicated that different readers tended to interpret the two terms differently,

322   depending on their standpoint. First, typically voiced by the panel's physical activity promotion

323   experts, was the argument that 'all movement is physical activity,' but it was also noted that, for

324   many of the panel, physical activity was associated with 'health-promoting' moderate-to-vigorous

325   physical activity (discounting many forms of movement). In contrast, the education experts in the

326   group typically viewed 'movement' as the most suitable term to use, but the physical activity

327   researchers felt that this did not sufficiently emphasize health-promoting physical activity. The

328   only resolution that was deemed acceptable to all, in order to reach consensus, was to include both

329   terms. Furthermore, to adequately capture the difference between process versus outcome

330   interpretations, a fourth defining statement was recommended.

331   Given the fact that the 80% consensus criterion score was not met after the second round of

332   the Delphi survey, a third round was needed. The third-round survey included the three revised

333   defining statements and a fourth describing the aspiration to be pursued. Once again, the

334   respondents were given opportunity to respond to the redrafted proposal of defining statements,

335   with open text for suggested revisions, clarifications, or concerns. Advice was sought regarding

336   stakeholder-specific phrasings to be included in an accompanying explanatory document.

337   Consensus was achieved in round three (>80%) regarding the four defining statements. Further, an

338   accompanying explanatory document was viewed as a suitable way of explaining the concept to

339   diverse user-groups.

340   As the final step of Phase One, stakeholder consultation was conducted by staff from the

341   ASC, requesting feedback from internal and external user-groups (ASC, sport sector, education

342   sector, community groups). Staff from the ASC were autonomous in this process and engaged a

343   wide variety of potential stakeholders through meetings, teleconferencing, email, and in

344   workshops. They provided feedback to the panel that user groups did not engage with the word

345   'affective' (under 'Constitution'), and that 'psychological' should be used instead. Panel members

346   were contacted for comment. There was no objection from panel members. Final wording was

347   agreed (see Results).

348   **Phase Two.** Phase two of the study, developing a standards framework, included six steps.

349   The study began with a review of curricula and standards documents, and a subsequent session to

350   establish a framework for progression/development. Next, the second one-day workshop took

351   place followed by the first round of Delphi survey, the second round of Delphi survey, and finally

352   a stakeholder consultation session.

353   To begin Phase Two, the principal investigators conducted an initial sampling of curricula

354   and standards documents, incorporating all available national curricula and standards documents

355   already in use within Australian Education and National Sporting Organizations. Contents were

356   extracted from the following: (a) ACARA Physical Education Curriculum; (b) Australian Early

357   Years Curriculum; (c) The Australian General Capabilities Curriculum; (d) The New South Wales

358   Physical Literacy Continuum; (d) Swimming Australia Standards; (e) Surf-Lifesaving Australia

359   Standards; (f) Cycling Australia Standards; and (g) ASC Talent Pathway Documents (FTEM =

360   Foundations-Talent-Elite-Mastery). An inductive thematic analysis of learning phases and

361   expectations in different domains was conducted (physical, psychological, cognitive and social)

362   maintaining a traceable audit-trail back to original documents (legacy documents containing each

363   draft are available from first author on request). Evidence from the systematic review (Phase One)

364   suggested that linking levels or expectations to age would be inappropriate and not reconcilable

365   with current evidence – particularly regarding aspects of psycho-social development.

366   Following this initial sampling and inductive thematic analysis, an initial framework was

367   created for describing progression/development that was not based on age or normative, linear

368   progressions. In collaboration with the education experts within the group, the System of

369   Observed Learning Outcomes (SOLO; Biggs & Collis, 1982) was proposed as a way of structuring

370   the progressions within the standards. The above inductive analysis of expectations and

371   competencies was mapped onto SOLO taxonomy learning stages. This initial draft was then

372   prepared to be presented to the panel at the second live workshop.

373   The second live workshop, conducted in Melbourne, began by introducing the panel to the

374   aims, key considerations and critical issues in developing the standards framework. The panel

375   were presented with a review of the project to date, and key current issues for feedback and

376   resolution, including: (a) the contents of the standards, (b) specific suggested wordings, and (c) the

377   arrangement of the standards into a 4x4 matrix (four levels of progression informed by SOLO

378   taxonomy, and four domains: physical, psychological, cognitive and social). The panel worked in

379   groups to offer written feedback directly onto printed samples of the draft standard. As a result of

380   these processes, the panel: (a) offered initial support for the use of the SOLO taxonomy to structure

381   the levels/progressions within the standard; (b) offered initial support for the standard addressing

382   all four learning domains: physical; psychological; cognitive and social; (c) recommended that

383   descriptors are worded in the form of 'I' statements, for self-evaluation (for example, 'I can…', 'I

384   do…', 'I am able to…'); (d) strongly recommended including a fifth learning level describing the

385   initial, as yet unfulfilled, potential to learn. This recommendation was agreed as it would be more

386   inclusive of all ages and ability-levels, as well as already being specified within the SOLO learning

387   taxonomy.

388   Once the recommendations and feedback from the live workshop had been incorporated into

389   a revised draft standard, a Delphi survey was initiated, seeking either consensus or further

390   constructive feedback. Consensus was sought regarding: (a) the use of four learning domains to

391   characterize physical literacy, (b) the use of the SOLO taxonomy to capture learning levels, (c) the

392   labels/descriptors to use for each learning progression/level, and (d) progressions. Consensus was

393   sought using three response choices: agree, agree with suggestions, and disagree with reason and

394   alternative. Consensus was reached regarding the questions statements as follows: (a) 'I agree with

395   the use of the four learning domains as a way to structure the standards' (89%); (b) 'I agree with

396   the use of the SOLO taxonomy as a way to portray the learning of physical literacy' (94%); (c) 'I

397   agree with the group/label names across the top of the standards document' (89%); and (d) 'I agree

398   that the levels within the standards should not have age or grades specified' (89%).

399   While >80% consensus was achieved in this round, valid comments and suggestions were

400   made that prompted a final round of panel feedback. Hence, in the final round of Delphi survey,

401   suggestions from the panel were incorporated and resubmitted for feedback and consensus.

402   Specifically, feedback was sought regarding the use of an analogy with the periodic table-of-

403   chemical elements to create a visual model to accompany the proposed standards. Upon reviewing

404   sample materials and a written explanation, consensus was reached using the following statement:

405   'I agree with the use of a periodic table metaphor to support and explain the physical literacy

406   standards' (82%). Further, consensus was maintained regarding the following statements: (a) 'I

407   agree with the use of the four domains in the visual model for physical literacy' (82%); and (b) 'I

408   agree with the use of the SOLO taxonomy as a way to portray the levels of each element in the

409   visual model' (82%).

410   With both a set of defining statements, as well as a standards framework and visual model, a

411   large practitioner workshop was held in Melbourne, with attendees from all the listed stakeholder

412   groups comprising over 50 participants. In a day-long workshop arranged and facilitated by ASC

413   staff, the draft project outcomes were presented to stakeholders from community and elite sport

414   and education sectors. Groups were arranged according to user-group, with researchers, educators,

415   community sport, elite sport, and policymakers typically seated together in their respective groups.

416   Each group provided feedback on worked up samples of the standards documents, along with the

417   opportunity for further feedback to be provided electronically during and following the workshop.

418   ASC staff collated and reviewed the stakeholder feedback, which was used to inform wording

419   updates and clarifications to the Standard. Feedback highlighted perceived tensions between the

420   standard and the contexts in which it will operate, including: alignment with existing frameworks

421   (e.g., curriculum); linear versus non-linear progression; and questions over who has a role in

422   determining what/how/when young people learn. It was recommended that the standard prioritize

423   local end-users (e.g., coaches, teachers, parents) to support progression from theory to practice. As

424   the final products were developed from academic outputs into branded materials and resources,

425   additional consultation was undertaken by the ASC with relevant stakeholders. These inputs

426   helped to emphasize the alignment with existing frameworks and to provide appropriate advice

427   regarding implementation issues (e.g., expectations for delivery, non-linear progressions, etc.).

428

429   **Results**

430   Through processes detailed in the Procedure section, the panel reached consensus that it

431   would require four defining statements to adequately introduce the concept of physical literacy to a

432   new audience, while also taking the opportunity to clarify key aspects of the definition. Note also

433   that the need for new wording was identified by end-users, and thus the stakeholder, and this

434   requirement informed the very framing of the study. Informed by a bespoke systematic review of

435   current published papers regarding physical literacy and, importantly, related concepts such as

436   motor development, physical activity participation, motivation, and confidence ASC, 2017a), the

437   panel members were active and critical participants in a debate-and-refinement process that led to

438   the following four defining statements:

439   •*Core:* Physical literacy is lifelong holistic learning acquired and applied in movement and

440   physical activity contexts.

441   •*Constitution:* Physical literacy reflects ongoing changes integrating physical, psychological,

442   cognitive and social capabilities.

443   •*Importance:* Physical literacy is vital in helping us lead healthy and fulfilling lives through

444   movement and physical activity.

445   •*Aspiration:* A physically literate person is able to draw on their integrated physical,

446   psychological, cognitive, and social capacities to support health-promoting and fulfilling

447   movement and physical activity—relative to their situation and context—throughout their

448   lifespan.

449   It was necessary to achieve consensus regarding the definition, or defining statements, prior

450   to developing a standards framework for understanding physical literacy. As well as reviewing the

451   specific wordings that were proposed in several drafts of the physical literacy standard, the panel

452   were required to reach consensus regarding: (a) the use of the four learning domains, suggested in

453   the defining statements, as a way to structure the standards (89% consensus); (b) the learning

454   model/framework to be used (SOLO taxonomy; Biggs, 1989; Biggs & Collis, 1982; Dudley, 2015)

455   as a way to articulate the structure and progression of learning within physical literacy (94%

456   consensus); (c) the group/label names, adapted from the SOLO taxonomy, that were to be used as

457   level descriptors in the standards document (89% consensus); and (d) that the levels within the

458   standards should not have age or grades specified (89% consensus).

459   To structure the learning progression, acknowledging it would be important to offer non-

460   prescriptive and non-linear developmental pathways, the group drew on Biggs' SOLO taxonomy

461   (Biggs & Collis, 1982; Biggs & Tang, 2011). In this approach, the unfulfilled capability to learn is

462   represented by a dot (*pre-structural*), whereas initial accumulations of experience varying only in

463   small degrees are represented first by a line (*uni-structural* – one area/topic/skill), and then several

464   parallel lines (*multi-structural* – several areas/topics/skills). While those lines are, of course,

465   linear, there are important additional aspects of learning. For example, when different learnings

466   become connected and compared/mapped, the translation of ideas between them takes place

467   through metaphor, analogy, and ultimately a deeper understanding of the structure of a skill or task

468   (*relational*). Further, there is a level of learning where these rich and connected mental models can

469   be abstracted and used creatively to solve new, novel, and interesting problems that do not follow

470   naturally from what was learned in the more 'linear' stage (*extended abstract*). A final Delphi

471   step, in response to feedback from the panel and stakeholders, led to the establishment of a range

472   of 'elements'—analogous to chemical elements in the periodic table—with which interested

473   participants could 'build' the profiles of movements and activities they wish to engage in. Further

474   details of how this might inform a subsequent measurement/assessment approach is presented by

475   Barnett and colleagues within this issue (see Barnett et al., 2019).

476   **Discussion**

477   This paper set out to establish how leading experts in Australia defined and construed

478   physical literacy, by using a modified Delphi methodology. These modifications were enacted

479   with a view to generating a product that was specifically suitable for adoption and implementation

480   by Australian teachers, coaches, parents, children, policy-makers, and researchers alike. To

481   address these challenges, the panel converged on a consensus that avoided 'forcing' a simple single

482   definition, and instead resulted in four defining statements. Within these four defining statements,

483   the panel reached consensus that physical literacy is composed of integrated developments and

484   adaptations spanning four learning domains: physical, psychological, cognitive, and social. Hence,

485   this important decision led to the proposal of a standards framework for physical literacy that drew

486   upon all four of these learning domains. Likewise, a set of guidelines was prepared (see Barnett et

487   al., 2019) to clarify the extremely diverse and non-linear approaches to assessment that are

488   facilitated by the expert panel's consensus exercise. That paper specifically emphasized that

489   approaches to evaluation should not seek normative benchmarks, interpersonal comparisons, or

490   narrow foci on exclusively physical, motor, or fitness criteria. Perhaps the most notable reflection

491   on this process is that developing a definition and standards framework for one context (Australia)

492   generates important new perspectives and insights regarding existing, established approaches.

493   The defining statements developed through this expert consensus exercise are notably

494   different in their wording from existing definitions at the time of publication, although it is

495   important to emphasize that several groups had sought to clarify that physical literacy comprises

496   integrated development spanning multiple learning domains, including the International Physical

497   Literacy Association (IPLA, 2017). While the IPLA specified physical, affective, and cognitive

498   domains, excluding the social, Mandigo, Francis, Lodewyk, and Lopez (2012) included these three

499   plus a social domain. Sport New Zealand (2018) went further, suggesting a spiritual dimension to

500   physical literacy. Likewise, all groups have emphasized that one's development in these domains

501   is 'entwined,' 'co-dependent,' 'integrated,' and/or 'holistic.' Ultimately, the expert panel reached

502   the consensus that using wording based on selected, quite Westernized (cf. Evans, 2014; Ward &

503   Quennerstedt, 2015; Williams, 2018), concepts from this wide range of developmental domains—

504   motivation, confidence, competence and knowledge—may be misleading, and potentially

505   inappropriate, not least when considering aspects of Australia's Indigenous and immigrant

506   cultures. Likewise, the live debates in workshops gradually grew to recognize that while there are

507   already thriving literatures in motor control, physical activity, motivation, and confidence, physical

508   literacy needed to be defined as more than simply the sum of those parts. While those literatures

509   are relevant and helpful for researching and guiding implementation within physical literacy, other

510   important concepts can be overlooked by focusing too narrowly on the four concepts typically

511   named in the definition of physical literacy. Likewise, important connections between concepts,

512   and emergent properties of systems, could be obfuscated by such a wording. Hence, while

513   different isn't always better (cf. Roberts, 2012), we contend that the four defining statements

514   developed by this expert panel may be both more appropriate for conveying the intended meaning

515   of physical literacy, as well as more readily adopted and integrated in the current practices of

516   teachers, coaches, health practitioners, parents, children, and policy-makers.

517   Further to the discussed changes in wording, a decision was reached by the panel to converge

518   on a series of defining statements, outlining: (a) the core of physical literacy – focused on the

519   inherent potential of all humans to learn through physical interaction with the environment; (b) its

520   constitution, based on integrated development spanning the four learning domains of physical,

521   psychological, cognitive, and social; (c) its importance, in that physical literacy helps a person to

522   learn more about the world, become more capable and ultimately pursue a range of fulfilling

523   activities, as well as the known benefits to health associated with physical activity; and finally (d)

524   the aspiration – describing a configuration, or possibly configurations, of this learning that

525   becomes self-perpetuating, such that the individual persists with physical activity and movement

526   pursuits, and/or re-engages following interruptions such as injury, or significant life-events.

527   Clearly, literature regarding physical literacy attempts to outline all of these, sometimes within the

528   definition (e.g., "…to take responsibility engagement in physical activities for life;" IPLA, 2017),

529   and sometimes in the accompanying text. Following a series of engaging discussions, the panel

530   members were ultimately satisfied that four transparent and clear statements were more

531   informative and accessible than attempting to convey all these points at once, in a single statement.

532   Further, attempting to convey the core, inherent potential of all humans to learn through physical

533   movement in the same sentence as alluding to the importance of frequent engagement in physical

534   activity for health was viewed as a potential source of tension and contradictions. Two thought-

535   experiments were helpful in this regard, both of which were to illustrate conceptual 'double-

536   dissociations' between physical literacy and (a) meeting the physical activity guidelines, and (b)

537   achieving good motor competence in a given skill or range of skills. Regarding frequent physical

538   activity, the panel were persuaded that someone who is highly disposed to engage in physical

539   activity and movement pursuits, but temporarily prevented by injury (for example), might

540   demonstrate a more adaptive form of physical literacy than someone who simply sits on an

541   exercise bike at the same intensity for the prescribed 30 minutes every day, without ever seeking to

542   improve or adapt. Thus, physical literacy could be conceptually distinguished from physical

543   activity. Likewise, a person who has become highly skilled in several motor competencies, but as

544   a result of disengaging and unenjoyable training experiences, may demonstrate a less adaptive

545   profile of physical literacy than someone who struggles to display co-ordination in kicking,

546   throwing and catching, but who enjoys engaging in physical activity and finds it fun/rewarding.

547   Hence, motor competence could again be theoretically distinguished from physical literacy,

548   allowing the panel to resolve queries as to whether physical literacy was one-and-the-same with (a)

549   physical activity, and (b) motor competence. The expert panel was satisfied that the

550   concepts/behaviors were highly related, but not the same. Overall, while operating 'in the shadow'

551   of pre-existing and popular definition wordings, we present these amendments as potential

552   progressions and improvements to how we define physical literacy, particularly with an emphasis

553   on presenting stakeholders with accessible concepts that are less likely to meet resistance when

554   being implemented by such a wide spectrum of 'end users' (ASC 2017b; Kristen, Ivarsson, Parker,

555   & Ziegert, 2015; Macdonald, Abbott, Lisahunter, Hay, & McCuaig, 2014).

556   In addition to the above work on conceptual clarity, which was required to pursue consensus

557   on a definition or defining statements, the group sought to develop a standards framework to

558   support implementation in a variety of settings, including schools, community sport, elite sport,

559   policy-making, research, adult exercise and health settings, and even aged-care. To pursue such a

560   framework, the facilitators conducted a thematic content analysis of existing models and theories

561   for physical education, sport development and physical activity participation. Once a wide range

562   of potential level-descriptors had been amassed, it was necessary to articulate the way such

563   competencies develop/progress – which was problematic once the original, foundational literature

564   review established that physical literacy should not be considered a 'linear' trajectory, or

565   articulated using normative expectations (e.g., age-based descriptors). Given the preponderance of

566   existing approaches and frameworks that use age as the key determinant of expectations, ranging

567   from school curricula to the Long Term Athlete Development model (Balyi, Cardinal, Higgs,

568   Norris, & Way, 2006), the panel spent significant time and effort negotiating this issue.

569   Ultimately, the education specialists within the group suggested (and debated) the potential of

570   Biggs' (1989) SOLO taxonomy to structure the learning progression or 'journey,' on a range from

571   holding the potential to learn, to accruing practice in a narrow skill-set, before several such

572   learning structures become relatable and comparable, ready to be abstracted and applied in new,

573   diverse, and integrated ways. Under this approach, one may characterize their own current profile,

574   or configuration, of physical literacy as anything from simply holding unrealized potential, to a

575   thriving and richly interconnected suite of physical activity and movement pursuits. Under this

576   approach, there is no 'failure' or 'illiteracy,' which is compatible with the intentions behind

577   physical literacy thinking (cf. Whitehead, 2001, 2010). Likewise, it was suitably clear that

578   comparing individuals can be problematic, as two learners may be achieving superficially similar

579   profiles, but in entirely different contexts (e.g., in water, on grass, or by climbing mountains).

580   The outcomes of this study carry many important implications for research, theory, and

581   practice, as well as the important linkages between these often-segregated considerations. It is

582   informative to reflect on the importance of conceptual clarity when presenting a novel concept to

583   audiences who may be hearing it for the first time. The 'implementation-ready' emphasis of the

584   current research forced the panel to reflect on this critical issue, and overall there was agreement

585   that seeking to over-simplify into a single statement defining physical literacy held the potential to

586   mislead and disillusion new audiences, and that parsimony should be pursued in the form of clear,

587   transparent statements addressing physical literacy's core, composition, importance, and aspiration.

588   Ultimately, as discussed elsewhere at length, simplicity/parsimony is a highly subjective

589   judgement, and not a reliable guide to validity (Baker, 2003; Sober, 1996). The panel in the

590   present study reflected on previous approaches before agreeing on a viewpoint of 'transparency-as-

591   parsimony,' as opposed to 'brevity-as-parsimony.' The issue of parsimony and conceptual clarity

592   permeates all of science, from pure research to implementation projects, and two contrasting

593   approaches to parsimony described above generate notably different solutions.

594   For researchers, the current findings carry an important implication; approaches to

595   measurement which depend on linear modelling, averages and simplistic inter-personal/inter-group

596   comparisons can all be highly problematic in relation to a holistic, complex concept such as

597   physical literacy. The standards framework put forward by this expert panel attempted to

598   emphasize unique and individual profiles that can be characterized at an abstract level (using the

599   SOLO taxonomy), but which are extremely difficult to directly compare and contrast between

600   individuals. Notably, statistical analysis techniques and modelling approaches do exist for

601   analyzing non-linear data, and the assumptions of simple linear scales do not necessarily need to be

602   applied to data in order to meaningfully interpret, model, and test theories (Ivancevic, Jain,

603   Pattison, & Hariz, 2009; Rattan & Hsieh, 2005). Measuring multiple constructs, frequently over a

604   prolonged time frame, especially with a view to identifying underlying emergent/latent variables, is

605   still quantitative but might be viewed as characterizing and modelling, rather than the commonly

606   conceived one-off 'measurement.' In fact, given that physical literacy, in the approach offered

607   here, is most closely associated with learning, then this characterizing of (non-linear, complex)

608   changes over time is a much more appropriate way of viewing measurement with respect to

609   physical literacy. Under the framework proposed in this paper, learning curves, rates-of-change,

610   and conditions facilitating change/learning, would all be more useful concepts than simply setting

611   up pre-to-post measures of isolated individual variables, averaged across large groups. Hence, as

612   noted earlier, considering how physical literacy may be best applied to a new context may also

613   generate useful insights and reflections regarding existing, established programs.

614   With respect to applied practice, one important implication of the defining statements and

615   standards framework put forward by this research is that any practitioner's *current practice* can be

616   readily encoded, *as it is*, into the visual model provided. The core of our proposed definition for

617   physical literacy is learning, which more fundamentally means any and all adaptations a person

618   experiences in relation to being physically embodied. Hence, anybody can engage with the *core*

619   defining statement, without needing to worry about achieving a level that is sufficient for health, or

620   even being concerned about whether what they currently do is 'right.' In fact, only the 'aspiration'

621   defining statement describes a configuration (or potential configurations) that may require

622   significant work and development/learning to attain. Likewise, the standards framework that has

623   been generated spans the full range from merely holding potential, through to engaging in rich and

624   diverse, fulfilling movement experiences.

625   Further, the resulting standards framework makes a point of including four domains of

626   learning, physical, psychological, cognitive, and social, and progressing through the 'levels'

627   requires increasing integration of learning between these areas. Hence, as well as allowing any

628   interested party to encode their own, or another learner's physical literacy, regardless of current

629   level, the framework also offers immediate guidance on how to progress in relation to their current

630   stage/phase. In this respect, the products of this Delphi study are presented as highly accessible,

631   inclusive, engaging, and supportive of participation and engagement. Importantly, once a person

632   understands which SOLO stage they are currently demonstrating in a particular skill or area, the

633   next step is also clarified. For example, the first step of learning any skill is to accumulate

634   experience and understand the basics, that is, how force and speed parameters might change in a

635   throwing or kicking movement. From there, the second stage might involve changing the context

636   or type of skill by small degrees so that a suite of relatable skill-sets is constructed (i.e., a series of

637   parallel lines); for example, staying with throwing and kicking, using different sized objects,

638   different surfaces, and using instruments such as rackets and bats may be appropriate progressions.

639   Once several 'parallel' learning structures have been accumulated, then a learner needs to be

640   encouraged to compare, contrast, relate, and transfer information between them, and this is a

641   difficult set of skills in themselves, as well as depending on the accumulation of experiences first.

642   Finally, once a learner becomes adept at relating and catalyzing learning between similar (but

643   perhaps, over time, increasingly diverse) skills, then they should be encouraged to transfer and

644   adapt this understanding into new, novel, and challenging environments. The skill of using

645   existing capabilities to solve new and unfamiliar challenges is important, and yet relatively rare

646   compared to those that have preceded in the learning history.

647   **Limitations**

648   This study contained several limitations, not least that the topic area to which we sought to

649   bring clarity had developed several tensions, obfuscations and, despite noble intentions, some

650   philosophical language that appeared to be discouraging the adoption and implementation of

651   physical literacy (Hyndman & Pill, 2017). Consensus from a Delphi process should not be taken

652   to mean that a 'correct' answer has necessarily been found, but rather that experts have been

653   engaged in seeking a convergence of opinion and state-of-the-art knowledge (Hsu & Sandford,

654   2007; Keeney et al., 2011). The products emerging from such a consensus should then be tested

655   and evaluated with a view to establishing their validity and applied utility, as well as being

656   constantly reviewed in relation to evolving best practice. While Delphi methodology has been

657   criticized for forcing consensus, and potentially not allowing panelists to elaborate on their views

658   (Goodman, 1987; Keeney et al., 2011; Pill, 1971), small modifications to the original approach

659   (e.g., the group workshops, stakeholder engagement and co-authorship model introduced in this

660   study) can still facilitate these important inputs and influences (Keeney et al., 2001). The products

661   developed during this process are presented as holding the potential to at least reduce the

662   inconsistencies and tensions in the physical literacy literature, both for application within Australia

663   but also with potential implications for other contexts, but that is not to say that these issues are

664   resolved once and for all. There remains scope to assess whether the solutions offered in this paper

665   transfer into other cultures and contexts, or whether they simply add another voice to a crowded

666   debate. As noted previously, it remains impossible to conclusively demonstrate that an ideal panel

667   has been convened, or that additional insight may have been gained by adding new members.

668   Nonetheless, the feedback from panel members, stakeholders, and end-users has been reassuring

669   that there is significant added value in the new wording choices and standards framework

670   developed. We also recognize that using a visual model with apparent stages and levels to

671   represent the physical literacy may predispose people to viewing development as linear and

672   normative. With the agreement of the key stakeholders, wording choices within the level-

673   descriptors and accompanying explanatory text (as well as a visual model based on an analogy to

674   the periodic table of elements; see Figures 1 and 2) were used to were used to prevent/minimize

675   such preconceptions from surviving anything beyond a cursory glance at the documents.

676   **Conclusion**

677   Overall, the task of defining and offering a framework for physical literacy has been, and

678   may continue to be, a challenging one for researchers and practitioners around the world. The

679   process followed in Australia for resolving these issues, as well as the products generated, are

680   presented here as transparently as possible, for review and consideration by a wider audience. We

681   hope that other interested parties, even if they choose to adopt another wording or approach, may

682   benefit from reflecting on the issues faced, and solutions generated, by this project. The most

683   important take-home messages from this study were that: (a) it may be helpful to distinguish

684   between two defining statements of physical literacy – the potential held by all humans versus the

685   aspiration to reach a stage where one's physical literacy is self-perpetuating and health-promoting;

686   (b) it is possible to conceptualize a holistic, highly integrated concept such as physical literacy, but

687   that many currently favored measurement approaches can undermine this process; (c) a standards

688   framework based on the SOLO taxonomy of learning was beneficial for characterizing physical

689   literacy informing measurement/assessment, and guiding activity planning according to learner

690   profiles; and (d) it can be beneficial to work closely with stakeholders and commissioning bodies

691   with an emphasis on end-user engagement and utilization. The emphasis of this study was to not

692   simply to create a 'correct' formulation, but rather to create a coherent, aligned solution from

693   definition and conceptualization through to products and materials, to promote adoption and

694   engagement. Overall, therefore, the emphasis of this study on creating a contextually sensitive

695   approach for Australia, as well as the emphasis on implementation and stakeholder engagement,

696   has generated both the product described herein, and important reflections and insights for future

697   programs seeking to promote physical literacy.

698

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869

870   Table 1

871   *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 (PE 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

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

873   Table 2

874   *Summary of the Panel's Initial Ratings of the Strength of Relationship Between Concepts and*

875   *Aspects of Physical Literacy. NB: Only means ≥5 are shown.*

| 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 towards 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	
FMS		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

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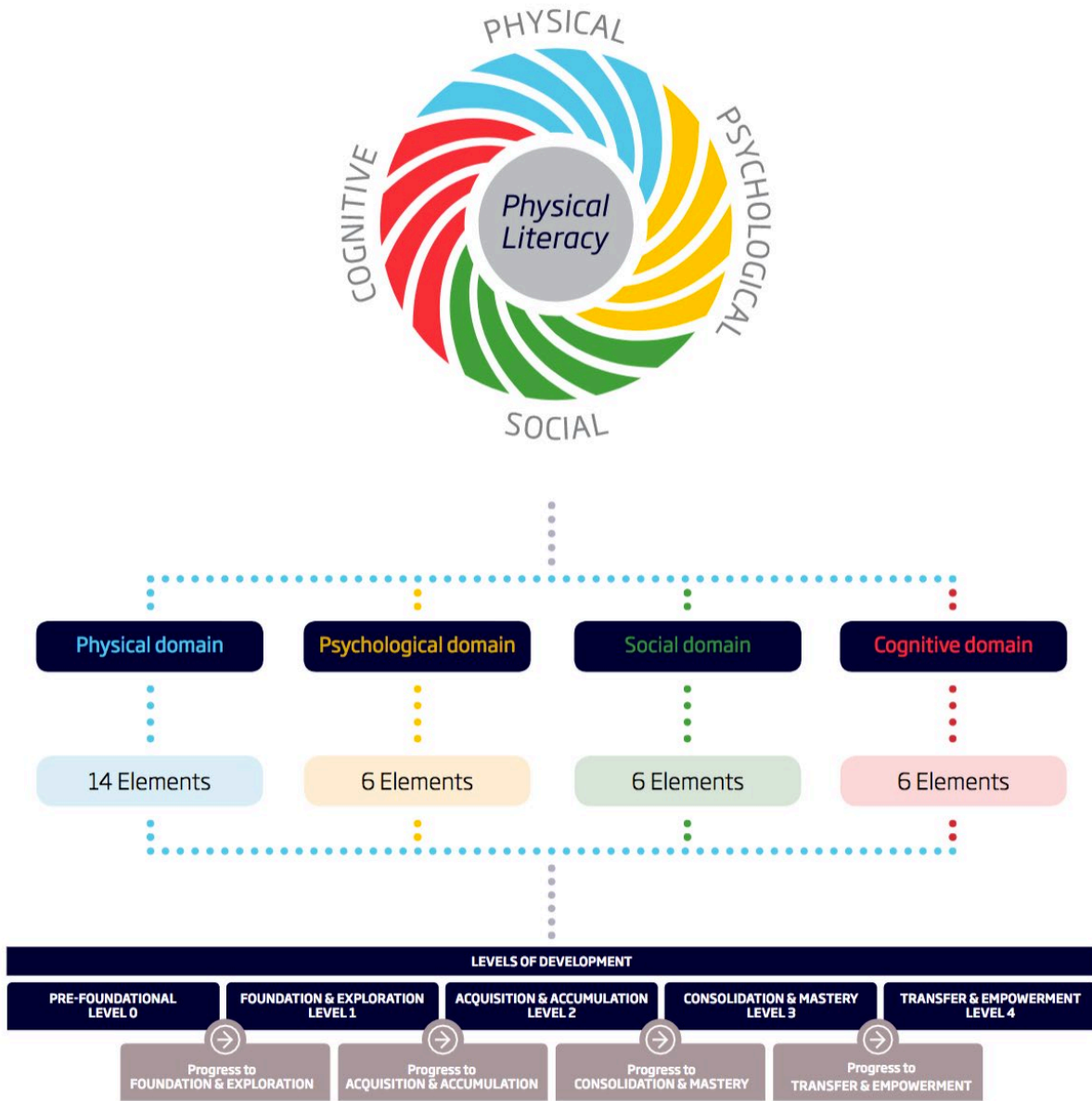
Figure 1. The resulting standards framework that was reviewed and agreed by the expert

panel, deemed to be a suitable "implementation-ready" framework to be recommended for

adoption by the stakeholders.

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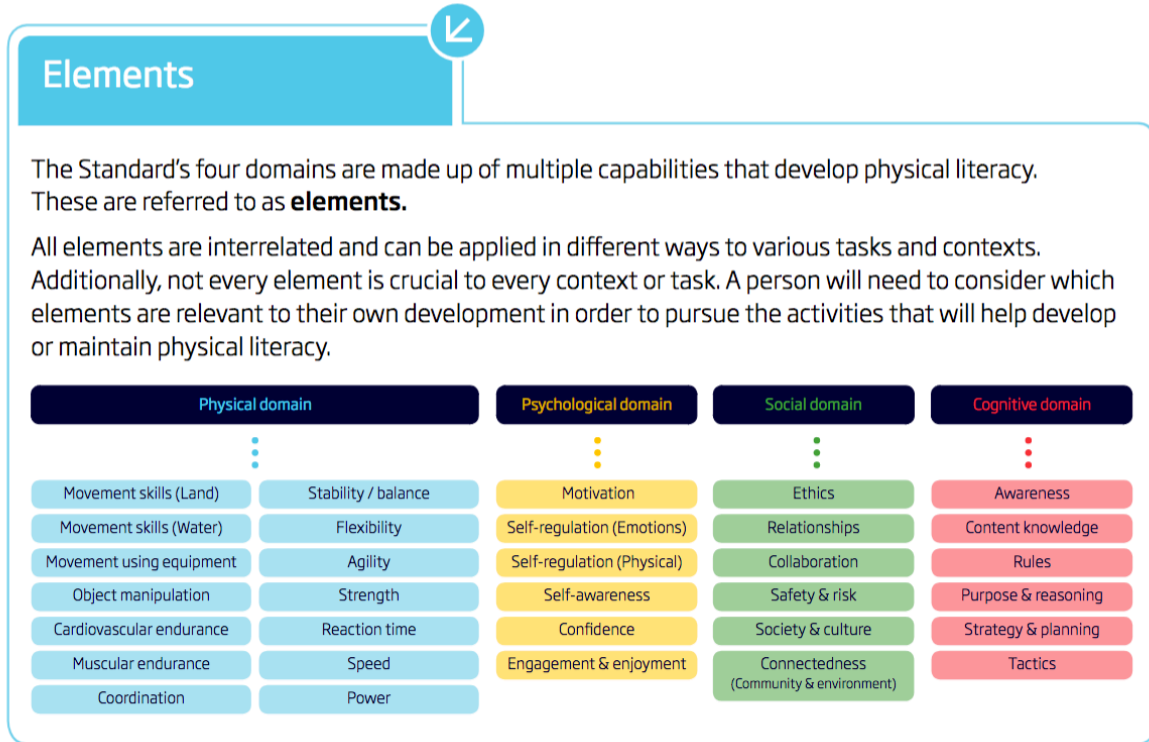
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884   *Figure 2.* The resulting physical literacy "elements" that were reviewed and agreed by the
885   expert panel and adopted by the stakeholder.

886