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Measuring' Physical Literacy and Related Constructs: A Systematic Review of Empirical Findings

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PURPOSE

The purpose of this **systematic review** was to **collate and analyze** empirical studies conducted on **physical literacy (PL)** and its related constructs, and to **synthesize**, and **reflect on**, current (up to 14 June, 2017) **empirical measurement** practice regarding PL.

BACKGROUND TO THE CONCEPT OF PHYSICAL LITERACY (PL)

While many policy makers and stakeholders currently advocate PL programs and interventions, the definitions of PL adopted by these schemes differ, thus causing disparities of how to best operationalize and measure/assess the concept. Edwards et al. (2017) conducted a systematic review of definitions and associations of PL, they found that the majority of papers (70%) adopted a 'Whiteheadian' definition of PL and that adopted by the International Physical Literacy Association:

"the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life"

Whitehead's concept of PL is based on the premise of a holistic individualized journey, with three identified philosophical underpinnings of phenomenology, existentialism, and monism—this differs from many of the competing definitions, which often do not detail their philosophical underpinnings. Overall, there are inconsistencies in the interpretation and operationalization of physical literacy that have led to a lack of clarity in intervention design. Debates acknowledging these philosophical standpoints have questioned whether physical literacy can be measured/assessed in any conventional sense, or at least what might constitute an appropriate method of collecting empirical data for the study of physical literacy. For the purpose of this article, the term measuring/assessing was taken to include charting, monitoring, evaluating, characterizing, and/or observing physical literacy, within empirical research studies.

GRASPING THE NETTLE: PHILOSOPHICAL ASSUMPTIONS

Assumptions about the philosophy of science permeate all science, but are particularly pronounced in the study of PL, as it is proposed from the outset as a concept steeped in philosophical language such as monism, existentialism, and phenomenology. Several assumptions have been proposed arguing that the reality of physical literacy is not the same everywhere, for everyone, and thus cannot be measured in an unbiased, neutral, or consistent way. Fundamentally, the focus of physical literacy should be the personal experience: a highly subjective integration of many different experiences spanning physical, emotional, mental, and social phenomena.

As a broad summary, two approaches have emerged in relation to how one understands the concept of physical literacy:

Idealist

An idealist perspective argues that physical literacy is a holistic concept, and therefore the three commonly cited domains of physical literacy cannot be separated. idealists are more likely to explore the concept of physical literacy through qualitative research approaches, such as in-depth interviews, reflections, and observations

Pragmatic

A practical perspective seeks to generate measures that are compatible with evidence-based practice, and contends that research is appraised on its practical implications. As a result, pragmatists may choose any methodologies that are compatible with these aims, and are therefore open to using a range of research methods including both qualitative and quantitative

To further complicate this debate, it appears that some researchers adopt a 'holistic' definition, yet appreciate the need for an operational (practical) method of measuring physical literacy. The tension appears to be between the desire to develop consistent, reliable, and valid measures of physical literacy, vs. the viewpoint that physical literacy is inherently complex and dynamic and thus not readily measured using such instruments.

Edwards, L.C., Bryant, A.S, Keegan, R.J., Morgan, K., Cooper, S-M., Jones, A.M (2017) '"Measuring" Physical Literacy and Related Constructs: A Systematic Review of Empirical Findings', Sports medicine (Auckland), 48(3), pp. 659–682.

Findings

Summary of studies

Two higher order themes were distinguished: qualitative approaches and quantitative approaches. For the qualitative higher order theme, 19 core categories were evidenced under the following six subthemes: interviews, open-ended questionnaires, reflective diaries, focus groups, participant observation, and visual methods. For the quantitative higher order theme, 36 core categories were evidenced under the following four sub-themes: (1) physical domain; (2) affective domain; (3) cognitive domain; and (4) physical, affective, and cognitive domains. From the analysis it was evident that 83% of qualitative papers used a Whiteheadian definition of physical literacy in their measures/assessments. The remaining 17% of papers measured/ assessed physical literacy by defining physical literacy as either: (1) developing literacy skills in a physical environment; (2) developing physical competency skills; (3) adopting the Physical and Health Education Canada definition; or (4) not declaring a specific definition.

Table 1. Thematic analysis of the measures/assessments of PL and its related constructs. Numbers in parenthesis represent the number of papers that referred to the core categories apparent out of a possible 32 papers

Higher order themes	Subthemes	Measures/assessments
Qualitative	Interviews (8)	Different environments (5) Determine the effectiveness of interventions (2) Students' and teachers' perceptions of inclusive PE (1)
	Open-ended questionnaires (4)	Pupil attitude, opinion and knowledge of PE (3) Willingness of PE teachers to apply physical literacy (1)
	Reflective diary (4)	Teacher reflections on the effectiveness of PE (1) Pupil reflections of food consumption (1) Pupil reflection to set individual physical activity targets (1) Student written responses to daily journal prompts (1)
	Focus groups (4)	Role of play in physical literacy from a child's perspective (1) Students' perceptions of ability, disability and inclusion in PE (1) Retired people's understanding of physical literacy (1) PE specialist primary and secondary teachers (1)
	Participant observations (4)	Children's interactions with the outdoor enviroment (2) Social interactions between retired people (1) Phenomenological observations of children (1)
	Visual methods (8)	Photo elicitation (2) Video recordings (5) Portfolio (1)
Quantitative	Physical domain (31)	Acceleromete (2) Exergaming (2) International Physical Activity Questionnaire (2) Pedomete (4) Postural tests (2) 20-m multi-stage fitness test (1) Anthropometric measures (2) Bruininks-Oseretesky Test of Motor Proficiency (1) FSM-Polygon (1) Henerson and Sugden's Movement Assessment Battery for Children (1) Agility test (2) Non-validated battery of six motor tests (1) Nutrition and Physical Activity Self-Assessment of Child Care (1) Perceptions of Physical Activity Importance and their Children's Ability Questionnaire (1) Performance diary (1) Physical Activity Questionnaire for Older Children (1) System for Observing Fitness Instruction Time (1) Straight sprint test (1) Taco Bell Challenge (1) T est of gross motor development (1) The Canadian Agility and Movement Skills Assessment (1) Vertical jump (1)
	Affective domain (8)	Brustad's Children's Attraction to Physical Activity Scale (1) Children's Physical Activity Self-Efficacy Scale (1) Children's Self-Perception of Adequacy in and Predilection for Physical Activiy Scale (1) Global Physical Self-Worth subscale of the Child and Youth Physical Self-Perception Profile (1) Harter's Self-Perception Profile for Children (1) Intrinsic Motivation Inventory (1) Non-validated affective questionnaire (1) Physical Ability subscale of the Self-Description Questionnaire (1)
	Cognitive domain (5)	Creative thinking test (1) Mock exam paper (1) Non-validated cognitive questionnaire (1) Optional creative writing assignments (1) Understanding physical literacy questionnaire (1)
	Physical, cognitive and affective (2)	The Canadian Assessment for Physical Literacy (2)

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FINDINGS

This paper is the first to provide a systematic review of empirical research efforts to measure or assessment PL, and is the first to systematically reveal that the concept cannot be measured/assessed in a traditional and conventional sense using simplistic and linear methods.

QUALITATIVE MEASURES/ASSESSMENTS

The interpretive nature of qualitative research could influence the strengths and limitations of methods/results and instigate bias; therefore, caution is required when solely relying on qualitative data. Interviews, open-ended questionnaires, reflective diaries, focus groups, and portfolios were unable to measure/assess an individual's physical competence as they are reliant on self-perceptions and/or perceptions of others. Aside from participant observation and video recordings, there were very few qualitative methods that measured/assessed the physical domain of PL. Some qualitative methods could be used to measure/assess social interactions with peers, namely, focus groups, participant observations, and video recordings. A critique of the current literature is that no measure/assessment to date has attempted to capture the social domain. Nevertheless, some qualitative methods captured interactions with the physical environment, to capture individuals' responses to "the embodied needs of the perceived environment" (participant observation and video recordings), though most qualitative methods could not capture interactions with the physical environment. Interviews, focus groups, participant observation, and video recordings were predominantly holistic in their philosophy, whereas open-ended questionnaires and portfolios did not declare a philosophy. The analysis revealed that the dominant environment to qualitatively assess physical literacy was during PE lessons. However, as the concept of physical literacy extends over the life course, it is problematic that the vast majority of qualitative research is concentrated within a school environment. More qualitative research with young adults, adults, and elderly citizens in different environments is required to better operationalize the concept over the life course is needed.

QUALITATIVE MEASURES/ASSESSMENTS

The definition of PL adopted by quantitative measures/assessments varied: 29% of measures/assessments used Whitehead's definition, 29% declared no definition, 24% defined PL as developing physical skills, 9% adopted the Physical Health Education Canada definition and a further 9% used Northern Ireland's definition. There was an assumption that the philosophical approach in quantitative research was positivism; however, the majority of quantitative measures/assessments did not declare their philosophical standpoint. In turn, most quantitative studies did not align with the holistic philosophy. Tests were usually timed, which was problematic as it omits the opportunity for quality of movement to be captured and also could create a comparative environment which contradicts the philosophical underpinnings of an individualised progress. Also, the attempts to develop quantitative tools that specify validated 'ages' leads to further debate surrounding their appropriateness for physical literacy as the 'stage not age' concept departs from normative assessment strategies.However, many quantitative measures/assessments are cost/time effective and easy to administer; therefore, they would be accessible in a variety of different environments (PE/community/other).

CONCLUSION

Quantitative measures/assessments more readily facilitate judgments of reliability, validity, and replicability; however, they are less aligned with physical literacy's holistic philosophy as defined by Whitehead.

Qualitative research aligned more with the holistic philosophical underpinnings of phenomenology, existentialism, and monism than did quantitative research.

Qualitative measures/assessments allowed researchers to measure/assess the complex and integrated phenomena, such as interactions with the physical environment, which may lead to more legitimate attempts to quantify PL holistically.

Overall, qualitative methods of inquiry have more potential to measure/assess the affective and cognitive domains than the physical domain of PL.

As identified by the present analysis, no currently available qualitative technique can adequately measure/ assess all PL domains, particularly in a way that reflects the integrated non-linear nature of the concept. Therefore, a combination of methods is required to better characterize overall PL progress.

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