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SPECIAL TOPICS: TOP 10 RESEARCH QUESTIONS

Top 10 Research Questions Related to Physical Literacy

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ABSTRACT

The term physical literacy is relatively new, and its definition, conceptual underpinning, how it is measured, how to change it, and its relationship with holistic health and wellness across the life span are a few of many foundational issues that lack consensus. At present, there are more questions than answers. The purpose of this article is to highlight 10 important research questions related to physical literacy with the hope of fueling future research activity and debate. Input was sought from international experts and practitioners on priorities and research gaps related to physical literacy. This list was supplemented by personal experience and research priorities identified in published manuscripts. From these various sources, the top 10 research questions related to physical literacy were compiled. Research related to physical literacy is in its infancy, and many important, even fundamental research questions and priorities remain unanswered. Research needs are summarized within 4 themes: monitoring physical literacy, understanding the physical literacy journey, enhancing physical literacy, and the benefits of physical literacy. Specific research questions relate to identifying measurable aspects of physical literacy and how they change across cultures and throughout the life span, as well as understanding the individual and environmental factors that describe the physical literacy journey and are effective targets for interventions. Physical literacy is increasingly recognized as the foundation for a healthy active lifestyle; however, robust research demonstrating its constitution, its relationship with health-related outcomes, and intervention strategies for its improvement remains to be completed.

KEYWORDS

Fitness; knowledge;
motivation; motor skills;
physical activity

The term “physical literacy” is broadly understood as an individual’s capacity for a physically active lifestyle. Until recently, research on physical literacy has been limited by the lack of a common definition. The work of Margaret Whitehead is most commonly cited in relation to the concept of physical literacy. She defined physical literacy as the motivation, confidence, physical competence, knowledge, and understanding to maintain physical activity throughout the life course (Whitehead, 2010). Tremblay and Lloyd (2010) proposed that physical literacy represents the foundation of characteristics, attributes, behaviors, awareness, knowledge, and understanding related to healthy active living and the promotion of physical recreation opportunities, as well as positive health choices across the life span. Others have defined physical literacy as being composed of various combinations of similar skills, abilities, and behaviors (Delaney, Donnelly, News, & Haughey, 2008; Haydn-Davies, 2005; Marsden & Weston, 2007; Penney & Chandler, 2000) and as having the ability to be physically active in a variety of

environments (Physical & Health Education Canada, 2014). For the purpose of this manuscript, we have adopted the definition that was developed by the International Physical Literacy Association (IPLA, 2015). It states that physical literacy is “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life” (Whitehead, 2014, as cited in IPLA, 2015).

The IPLA definition emphasizes not only individual characteristics (e.g., motivation, knowledge, physical competence), but also engagement in physical activity for life. The desired outcome of a “healthy active lifestyle” is, therefore, contingent upon both the underlying attributes and characteristics that contribute to the capacity for physical activity and a commitment to habitually perform the required behaviors—a lifestyle. Based on this definition, a physically literate child is one who has the motivation, confidence, knowledge, skills, and fitness necessary to enjoy a physically active lifestyle

and who is committed to healthy habitual movement behaviors, including recommended regular physical activity and limited sedentary behavior.

In addition to early and ongoing debate around the definition of physical literacy, there is a general lack of consensus regarding its conceptual underpinnings. Is it possible to measure physical literacy, and if so, how can it be done across the life span? Can physical literacy be improved? If so, how can the deliberate change be recognized and measured amid the naturally changing quality of physical literacy? Does physical literacy have any relationship with holistic health and wellness? At present, there are many more questions than answers. The purpose of this article is to highlight 10 important research questions related to physical literacy with the hope of fueling future research activity and debate.

To arrive at the top 10 research questions presented in this article, three methods were used to gather suggestions, ideas, and insights. First, input was sought from international experts and practitioners on priorities and research gaps related to physical literacy. An e-mail invitation was sent to recognized leaders in physical literacy research and practice to solicit suggestions for research priorities. Second, research priorities identified in published manuscripts on physical literacy were collated. Third, a list of research priorities based on the experience of the authors and those accrued through the development of the Canadian Assessment of Physical Literacy (<http://www.capl-ecsf.ca>) were compiled. From these various sources, the top 10 research questions related to physical literacy were selected. Given the international definition currently available, research questions related to discrepancies in the definition of physical literacy were excluded from further consideration. Research questions/topics were also excluded if they were specific to only one component of physical literacy or did not reflect the international definition of physical literacy. Qualitative analysis techniques were then used to summarize the information that related directly to the broad concept of physical literacy as it is currently defined. Higher priority was assigned to questions that appeared consistently across multiple information sources. Questions that could be investigated using existing knowledge or techniques were prioritized over those that would require extensive background research. From this analysis, four broad themes for research topics emerged: monitoring physical literacy, understanding the physical literacy journey, enhancing physical literacy, and the benefits of physical literacy. The 10 research questions are described within these four themes.

Important research questions

Monitoring physical literacy

The ability to monitor the physical literacy journey in an accurate and repeatable manner is foundational to both research and educational/support efforts. To date, assessments that combine all aspects of physical literacy and that have established validity, objectivity, and reliability (Longmuir, 2013) have focused on North American children of school age.

1. Do the important components for monitoring progress in physical literacy differ by culture or across the life span?

If we accept the essential nature of our need to monitor the physical literacy journey, the logical next question is, “How?” How do we monitor physical literacy among the youngest children and the oldest adults? How do we weave together necessarily different monitoring methods and/or underlying components to assess progress in the physical literacy journey? How do we monitor physical literacy among cultures that have different beliefs, priorities, or cultural norms related to physical literacy? How can such information aggregated at a population level help to inform future monitoring, evaluation, and intervention efforts? Because consensus around a definition of physical literacy has only recently emerged, it is not surprising that there are few valid and reliable assessments that encompass the broad range of components that contribute to physical literacy. For some components of physical literacy, there are well-established protocols, while others cannot yet be objectively monitored in a valid and reliable manner. Protocols for the assessment of physical working capacity or physical fitness are well developed across the life span (Heyward & Gibson, 2014). Many countries have implemented population-based assessments of physical fitness (Anderssen et al., 2007; Duncan, Li, & Zhou, 2005; Ekelund et al., 2007; Shields et al., 2010; Tomkinson, Leger, Olds, & Cazorla, 2003; Tremblay et al., 2010), but questions regarding the cultural relevance of these protocols remain (Tremblay, Esliger, Copeland, Barnes, & Bassett, 2008). Assessment protocols to measure fundamental movement skills in children are also well established (Cools, DeMartelaer, Samaey, & Andries, 2008; Ulrich, 2000). However, valid and reliable methods of monitoring movement skill throughout the life span and across cultures are required. There is also a need to develop monitoring methods for more complex and combined movement skills for all ages and cultures (Burton & Miller, 1998; Payne & Isaacs, 2002). Beyond

these measures of physical competence, the options to monitor physical literacy in a valid and reliable manner are extremely limited. There are important research opportunities related to the development of methods to monitor the motivation, confidence, and knowledge and understanding components of physical literacy. There is also a great need for research that can develop an appropriate method for monitoring the individual's capacity for taking responsibility for engagement in physical activities throughout life. Measures of all components of physical literacy need to be constructed and connected from early childhood to late adulthood such that interpretation of the results is meaningful to understanding and evaluating the physical literacy journey at both an individual and population level.

Once we have the required methods for effective monitoring, additional research will be required to examine how, where, and when they should be applied. Should motivation, confidence, physical competence, knowledge, and understanding be measured at all ages or stages of development? How should these components be weighted within the overall concept of physical literacy? For example, is knowledge and understanding or motivation equally important for very young children whose physical activity may be largely determined by the adults who care for them as they are for older autonomous children or adults? If physical competence is limited by disability, would that preclude the individual from progressing on the physical literacy journey? What are desirable outcomes in terms of individual progress on the physical literacy journey and/or collective achievements across age or cultural groups? Research on the relationships among measured variables and within and across population strata is in its infancy, and research opportunities abound.

2. How can we chart progress in the adaptive components of physical literacy?

When one considers the assessments that are currently available for monitoring the physical literacy journey, it quickly becomes apparent that the research to date has focused almost exclusively on independently observable characteristics. Does an individual have the movement skills needed for an activity? The answer to that question is relatively easy to obtain through objective measures or observation of performance. Monitoring the components of physical literacy that cannot be directly observed, such as motivation, confidence, and knowledge, is arguably much more complex, making the development of appropriate monitoring strategies more difficult. The complexity of physical literacy as a concept comes into sharp focus once we recognize that the physical literacy

journey embodies much more than measures of observable (movement skill, fitness) or unobservable (motivation, knowledge, confidence) components. If individuals are to “engage in physical activities for life,” they not only require the requisite foundational components but also the capacity and willingness to utilize those components as required. The ability of the individual to adapt their motivation, confidence, physical competence, knowledge, and understanding based on how they understand and respond to their environment is an area particularly devoid of valid and reliable monitoring protocols. How do individuals recognize and adapt to what is required for physical literacy at a given point in time or under varying social and environmental conditions? How do individuals decide on the movement skills needed to engage in meaningful physical activity across diverse environments and points in time? How does the physically literate individual optimize performance even in novel situations? How much do the adaptive components of physical literacy differ across the life course and ethnic, geographic, and/or geopolitical circumstances? Are the mechanisms of physical literacy important, or is it sufficient to know that someone is physically active throughout life? These examples are just a few of the questions that will only be answered through innovative research on the adaptive components of physical literacy.

3. How should physical literacy be monitored within typical physical activity settings?

The Canadian Assessment of Physical Literacy (<http://www.capl-ecsf.ca>) is an example of a valid and reliable tool that addresses the motivation, confidence, physical competence, knowledge, understanding, and behavioral aspects of physical literacy (Longmuir, 2013) among children aged 8 to 12 years old. However, its comprehensive nature also means that it can be time-consuming to administer (4 hr for a group of 20–25 children) and may require staff skills and experience beyond those available in many physical activity settings. The complexity of comprehensive physical literacy monitoring is further emphasized when one considers that such an assessment is valid and reliable for only a small, relatively homogeneous segment of the vast population of individuals whose physical literacy journey we may wish to monitor. Even this one monitoring tool becomes much more complex if it is adapted to individual or environmental variables such as previous experience, age, cultural background, societal expectation, economic resources, or even local climate. The complexity of a comprehensive physical literacy assessment is in sharp contrast to the very minimal resources

(time, equipment, staffing, etc.) typically available in a majority of physical activity settings. Only a very tiny proportion of the population would have the expertise needed to administer such an assessment, making the use of this assessment unrealistic for most individuals. Even if one restricts the focus to structured physical activity settings, where a leader is responsible for providing a specific type of physical activity opportunity, the skill, expertise, and resources available for monitoring remain very low. The vast majority of physical activity leaders have little to no training in physical literacy or physical activity assessment, with the exception of those who work with elite athletes and those who access personal services (e.g., personal trainers or coaches). For most participants in structured physical activity settings, the leader is likely a well-intentioned volunteer, a student working part-time, a generalist teacher, or a leader whose primary expertise is their personal enthusiasm for the activity. Given this background, research is required to identify methods of monitoring physical literacy that are practical, valid, and reliable given the limited expertise and resources typical of physical activity settings. How can individuals of all ages effectively monitor their own physical literacy journey? What are the minimum requirements or experience and expertise for someone who could monitor the physical literacy journey of others? What setting is best suited for monitoring the physical literacy journey (e.g., school, sport, recreation, fitness, health care, public health)? Do all components of physical literacy need to be included in all monitoring efforts? How can monitoring be accomplished with minimal resources, and how does that affect the resulting recommendations? These questions are just a few that need to be addressed to enable effective monitoring of the physical literacy journey across the broad spectrum of physical activity experiences.

Understanding the physical literacy journey

Physical literacy is conceptualized as a journey that every individual takes throughout their life. It is not something one does or does not have, or does or does not achieve. Rather, it is the individual's lived experience of physical activity. By its interactive nature, an individual's physical literacy is therefore expected to vary, from day to day or even minute to minute, in response to the interaction of the individual with the environment. Do you go for a run every day but struggle on days when it is raining? Your struggle represents the variation in your physical literacy (primarily the motivation component in this example) in response to an environmental factor. Our understanding of the physical literacy journey is currently very limited, with research data limited primarily to children of school

age within a relative stable environment. Similar to the need for additional monitoring strategies, there is a need for future research to enhance our understanding of the totality of the physical literacy journey across ages, developmental stages, and cultures.

4. How does the physical literacy journey vary with individual factors?

If one assumes that measures of physical activity behavior are a barometer of the physical literacy of a population, then there is a plethora of research that clearly documents the variability of the physical literacy journey (Colley et al., 2011a; Garriguet & Colley, 2012; Troiano et al., 2008; Wittmeier, Mollard, & Kriellaars, 2007). We know that the amount of physical activity performed each day varies within individuals (Colley et al., 2011c), and there is much research examining correlates of physical activity participation (Sallis, Taylor, Dowda, Freedson, & Pate, 2002). However, there is a need for research that more clearly describes the individual-level factors associated with higher and lower levels of physical activity. There is also a need to understand how these individual-level factors impact progress along the physical literacy journey. Are there sex or gender differences in physical literacy and/or its developmental trajectories? How do individual factors (race/ethnicity, education, previous experience, etc.) affect physical literacy across the life span (e.g., by age/developmental stage)? How is the physical literacy journey impacted by significant disability or acute or chronic disease? To enhance our understanding of the physical literacy journey, we need to identify not only the impact of these individual factors on physical activity behavior, but also how they impact motivation, confidence, knowledge, understanding, physical competence, and the ability to take responsibility for engagement in physical activity throughout life.

5. How does the physical literacy journey vary by environmental factors?

As stated earlier, existing research clearly demonstrates the impact of a wide variety of environmental factors on physical activity participation (Bauman et al., 2012). Using the assumption that physical activity behavior is a barometer of physical literacy, we know that people are more active in certain environments, such as when the weather is favorable, when there is a safe and engaging place to be active, and/or when societal norms are supportive of physical activity. However, beyond the behavior of physical activity, we know very little about the impact of environmental factors. Do motivation and confidence or knowledge and understanding vary by socioeconomic status? Are environmental variables

important influences on physical competence? Are the components of physical literacy related to societal norms or cultural beliefs? How do differences in economic development affect the physical literacy journey? These questions are the most common when we think about environmental factors that influence physical activity. However, research also needs to focus on the impact of environmental factors within the physical activity setting. How do the attitudes or expectations of the physical activity leader/coach/teacher influence the physical literacy journey? Is the physical literacy journey influenced by other participants, parents, or spectators? Is it influenced by those involved in parallel activities? What is the impact of the physical activity opportunity itself? Do structured and unstructured physical activity opportunities provide the same support for physical literacy? Does formal instruction provide greater benefits? We currently have little to no understanding of the impact of these environmental factors beyond what is known about their impact on the acquisition of movement skills of physical fitness (Bassett & Howley, 2000; Haskell et al., 2007; Seefeldt, Malina, & Clark, 2002; Yusuf, Reddy, Ounpuu, & Anand, 2001).

6. How do individual and environmental factors important to the physical literacy journey interact?

Given the principle of physical literacy as a lifelong journey, it can be assumed that there will be a complex and varying array of important influences. Our understanding of the physical literacy journey will remain incomplete until we can understand how the important individual and environmental factors interact. How do these important factors interact throughout the physical literacy journey? Are the interactions similar for all individuals within the same environment, or even across different environments? Do the important environmental factors interact in a similar manner among all individuals or throughout the life span of each individual? How can we monitor the complex, multivariable interaction of all of these factors? Answering these questions will enhance our knowledge of the complex web of relationships that are most important to physical literacy across the life span. Even more complex, and perhaps more important, is the need for research to examine how these complex interactions vary. What is the relationship between individual and environmental factors across different ages/developmental stages or between different cultures? Research is needed to enhance our understanding of how these complex interactions vary throughout the physical literacy journey. Longitudinal studies will enhance our understanding not only of each stage of the journey, but of how those stages interact. Are there aspects of the

physical literacy journey that need to occur before others? Will progress made at one stage of the journey impact subsequent stages? How are the later stages of the journey (as adults or older adults) impacted by preceding phases of the journey? Such longitudinal studies are essential if we are to more clearly understand the physical literacy journey in its entirety.

Enhancing physical literacy

The sedentary lifestyles that are currently the norm in developed countries (Colley et al., 2011b, 2011c; Lou, 2014; Matthews et al., 2008; Ruiz et al., 2011) and are increasing in developing countries (Lear et al., 2014; Tremblay et al., 2014) suggest that physical literacy levels are suboptimal and at risk for further decline. Future research is required to identify effective methods for enhancing physical literacy across the population and across the life span. Just as our understanding of the physical literacy journey will be enhanced through research examining both individual and environmental factors, our understanding of how to most effectively support progress on the physical literacy journey will require greater knowledge of the individual and environmental factors that characterize successful interventions.

7. What are the key individual factors/targets/qualities for successful interventions to support the physical literacy journey?

Based on our definition of physical literacy, motivation, confidence, physical competence, knowledge, and understanding could be said to be the most obvious individual-level factors or targets for physical literacy interventions. However, such a statement would be overly simplistic in relation to the complex construct of physical literacy. Research suggests that there are other, important individual-level factors, such as education, physical training, previous experience, or personal beliefs. It is also likely that additional research in this area will continue to expand the list of important individual-level factors. One of the greatest fallacies of intervention research is the assumption that an associated factor is equivalent to an important intervention target. This is not necessarily the case. For example, limited motivation is considered to be an important barrier to physical literacy, which suggests that increasing motivation may be a key intervention target. Although this statement may be true for some, there are many others for whom physical literacy is almost independent of motivation. Research among children with and without chronic medical conditions (Longmuir, Alpous, Hamer, Pohl, &

Lougheed, 2015) has shown that motivation for physical activity is similar, even though physical activity behavior is significantly different. Children with chronic medical conditions are often more highly motivated toward physical activity compared with their healthy peers, but deficits in other components of physical literacy (e.g., physical competence) constrain their participation. Research must remain focused on factors that are amenable to change through an intervention.

8. What are the key environmental factors/targets/qualities for successful interventions to support the physical literacy journey?

The distinction between physical literacy correlates and effective intervention targets, discussed earlier, applies also to environmental factors. The limited success of community-based interventions designed to promote physical activity is but one example of the perils of equating determinants with intervention targets. For example, research demonstrates a direct link between active transportation and daily physical activity (Larouche, Saunders, Faulkner, Colley, & Tremblay, 2014), and yet, interventions to increase active transportation opportunities have produced inconsistent results (Chillon, Evenson, Vaughn, & Ward, 2011). Future research on environmental determinants for interventions should examine known environmental correlates (e.g., social support, societal expectations, safe and motivating facilities) in addition to aspects of the physical activity setting itself. To what extent is physical literacy supported or shaped by free play versus physical education versus sport participation? How does the experience, attitude, motivation, or education of the activity leader impact the effect of the intervention on the physical literacy journey? Are intervention efficacy and effectiveness influenced by setting (e.g., home, school, recreation, sport, public health, health care, combinations)? And, if so, how and why? Questions such as these need to be answered.

9. How can individual and environmental factors be optimized to enhance intervention effectiveness?

Given the complexity of physical literacy, it would seem unlikely that a few individual and/or environmental factors will be found that alone could optimize the physical literacy journey for everyone. As such, a coordinated program of research focused on systematically evaluating intervention effectiveness may be required. Research to date has focused on different intervention targets, relied on different intervention methods, and utilized a variety of evaluation techniques. As a result, it is virtually impossible to synthesize the

results from different trials to build a comprehensive, cohesive body of knowledge. For example: Intervention X was effective in Group A when measured by Outcomes 1, 2 and 3, while Intervention Y was effective in Group B as measured by Outcomes 5, 8 and 9. Given individual and environmental variability, such a haphazard approach is unlikely to unlock the secrets to optimally effective interventions across the life span and in different cultures. Research is required that examines not only a specific intervention in a specific population, but the generalizability of the intervention benefits throughout the physical literacy journey and across populations. Do the important individual and environmental factors/targets vary across the life span (e.g., by age/developmental stage/ability)? How do the triggers for advancement along the physical literacy journey differ among people of different abilities or at different stages of the journey? Are the benefits of an intervention that increases physical literacy at one age/developmental stage maintained through later developmental/life stages (e.g., Does an effective intervention to increase physical literacy in children enable those children to maintain higher levels of physical literacy in adolescence or adulthood)? What interventions are most effective for enabling those with lower physical literacy to restart their physical literacy journey? Do interventions for remediation need to differ from interventions to maintain current levels of physical literacy? Through these types of efforts, we can enhance our understanding of the approaches, settings, and intervention content most likely to promote and support the physical literacy journey at all ages/stages of development (from the youngest child to the oldest adult) around the world.

Benefits of physical literacy

If one accepts that physical literacy levels are currently suboptimal across the life span, a significant investment will be needed to enhance physical literacy at a population level. To justify such effort and investment, future research is required to clearly define the benefits of increased physical literacy.

10. Across the life span, what are the benefits of higher levels of physical literacy?

Higher levels of physical literacy are theorized to provide both individual and societal benefits. Research to clearly document these benefits is extremely important, but lacking. Existing research is extensive in relation to the individual benefits of daily physical activity (Centers for Disease Control and Prevention, 2008; Malina, 1994; Public Health Agency of Canada, 2005). Research into

societal benefits from physical activity has focused primarily on health outcomes, and in particular, economic benefits (Janssen, 2012; Kohl et al., 2012; Lee et al., 2012). Although it is possible to distinguish individual and societal benefits, research that examines the individual benefits of increased physical literacy in conjunction with the societal benefits that will also accrue is encouraged. Future research should move away from a focus solely on physical activity or physical health and instead encompass all of the components of physical literacy. How does increased physical literacy impact or relate to current and future emotional health or quality of life? How does physical literacy impact or relate to academic learning or career or life satisfaction? Does the relationship between physical literacy and important physical, mental, emotional, spiritual, and environmental health indicators differ from these relationships with the individual subcomponents of physical literacy? If so, how? If not, what is the value-added of developing physical literacy versus only some of its component parts? These are important avenues for research if the full spectrum of physical literacy benefits is to be recognized.

Conclusion

The field of physical literacy research is in its infancy. There are currently many more questions than answers. To advance this field, new research efforts are required to better elucidate effective methods of monitoring physical literacy so we can better understand the physical literacy journey. Research to identify effective methods that can be used to enhance physical literacy or support progress on the physical literacy journey and enunciate the individual and society benefits of physical literacy is also recommended.

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