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PHYSICAL ACTIVITY AND HEALTH

Education and Measurement are the Top Priorities to Advance Physical Literacy for Individuals with Physical Disabilities

RESEARCH

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ABSTRACT

Background: Most individuals with physical disabilities do not meet physical activity recommendations, which may negatively impact quality of life. Physical literacy is a concept that considers the key elements necessary to support lifelong physical activity. Limited attention has been directed towards physical literacy for individuals with physical disabilities.

Objectives: To obtain expert consensus on strategic priorities to delineate the next steps on physical literacy for individuals with physical disabilities.

Methods: The Collaborative Prioritized Planning Process was followed during a two-day online consensus meeting with experts in disability and physical activity. This systematic four-step process involved: 1) knowledge synthesis before the meeting, 2) challenge identification and prioritization, 3) solution identification, consolidation and prioritization, and 4) action planning.

Results: Thirty-one experts participated in the meeting. Five challenges related to physical literacy for individuals with physical disabilities were prioritized. The following solutions were suggested: developing a massive online open course, creating a physical literacy measurement toolkit, developing a physical literacy resource portal, creating a national database of physical literacy outcomes, and redefining an existing international consensus statement for physical literacy to be more inclusive.

Conclusions: Collaborations between experts are needed to advance the research in physical literacy for people with disabilities through education and measurement.

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INTRODUCTION

The global prevalence of musculoskeletal and neurological disorders was recently estimated to be approximately 2 billion people (Cieza et al., 2020). In Canada, mobility impairment is the third most prevalent cause of disability, comprising of approximately 4.2% of children under the age of 15 years, 22.2% of individuals aged 15 years, and 47% aged 75 years and over over who have physical disabilities (e.g., pain, flexibility, mobility, seeing, hearing and dexterity) (Canada, 2009; Duclos, 2003; Stuart Morris, 2018). Similarly, there are about 26% of adults living with disabilities in the United States, representing 61 million individuals (Okoro et al., 2018; Prevention, 2020).

Physical activity, defined as any bodily movement produced by skeletal muscles that requires energy expenditure, has important health benefits (Caspersen et al., 1985). Specifically, leisure-time physical activity, that is accrued during one's free time (e.g., playing sports, exercising, going for a walk or wheel), has been associated with numerous physical (e.g., reduced risk of cardiovascular disease and metabolic disorder) and psychosocial (e.g., reduced risk of depression and social isolation) health benefits for children, youth and adults with physical disabilities (Martin, 2013; Murphy & Carbone, 2008; Ploeg et al., 2004; Wright et al., 2019). However, children and adults with disabilities are not active enough to accrue the health benefits, reporting less physical activity and participation in sport and recreation programs than their able-bodied peers (Law et al., 2006; Ploeg et al., 2004; Rimmer et al., 2004; Services, 2000; Shikako-Thomas et al., 2008; Wright et al., 2019). For adults with physical disabilities, particularly those who use wheelchairs, participation in physical activity is minimal or nonexistent (Best et al., 2014; Ginis et al., 2010; Rocchi et al., 2017). This is alarming given that the current Canadian Guidelines for adults ages 18 to 65 years recommend at least 150 minutes of moderate to virogous aerobic physical activity per week. The absence of physical activity practice was further highlighted in a recent paper reporting that 50% of individuals with spinal cord injury report not doing any physical activity at all (Rocchi et al., 2017). Current Canadian guidelines for all children and youth ages 5 to 17 years (i.e., with and without disabilities) recommend an accumulation of 60 minutes of daily moderate-to-vigorous physical activity (e.g., walking/wheeling, sports, physical therapy) and at least 3 days per week of vigorous-intensity and bone strengthening activities (e.g., swimming, dancing, lifting weights) to accrue the associated health benefits (Handler et al., 2019; Tremblay et al., 2016). However, between 2007–2015, only 4 to 9 % of typically developing Canadian children attained the minimum recommendations (Colley et al., 2017; Colley et al., 2011). Children with disabilities are approximatley 16% less physically activity than their peers (Ginis et al., 2021), with an estimated 5.3% of children and youth with various physical and intellectual disibilities in Canada meeting the physical activity recommendations in 2021 (Moore et al., 2021).

Inadequate physical activity can negatively impact health, social participation and overall quality of life (Colley et al., 2011; Diaz et al., 2019; Murphy & Carbone, 2008; Rimmer & Rowland, 2008; Saxena & Shikako Thomas, 2020; Trost et al., 2014). While physical, psychosocial and economic factors contribute to physical activity levels in able-bodied individuals (Martin, 2013; Wright et al., 2019), general consensus highlights the need to explore the factors of reduced physical activity in children, youth and adults with physical disabilities, as people with disabilities can especially benefit from an active lifestyle (Martin Ginis et al., 2016; Ploeg et al., 2004).

A common factor attributed to inadequate physical activity in children and adults without disabilities is low levels of physical literacy (Cairney et al., 2019). Physical literacy is conceptualized as the abilities required to fully engage in physical activity for life, encompassing multifaceted elements of motivation, confidence, engagement, knowledge and physical competence. These factors are interdependent of each other for promoting and achieving an active lifestyle (Giblin et al., 2014), and are essential to establish a critical foundation to support physical activity participation and childhood development (Zimmer et al., 2016). Additionally, components of physical literacy are strong predictors of life-long participation and sustained physical activity in different environments (Baker et al., 2009; Hands, 2012; Stathokostas et al., 2017; Zimmer et al., 2016).

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A recent initiative from a group of Canadian researchers has resulted in a comprehensive assessment of physical literacy of Canadian children (Tremblay, Longmuir, et al., 2018). While this initiative is a first step towards a better understanding of the assessment of physical literacy, the focus was solely on typically developing children. The concept of physical literacy has received little attention regarding the inclusion of individuals with physical disabilities (Pushkarenko et al., 2020; Saxena & Shikako Thomas, 2020). In fact, the current definition, the available toolkits and accessible information on physical literacy are not adapted for children and adults with physical disabilities (Kaioglou & Venetsanou, 2020). Moreover, current physical literacy assessments are not adequately adapted for individuals with physical disabilities (Saxena & Shikako Thomas, 2020). Given the prevalence of physical disabilities and the impact that physical literacy can have on predicting lifelong participation in physical activity, it is critical to consider the factors of physical literacy specific to disability. Consideration of individuals with physical disabilities within the conceptual framework of physical literacy is much needed. Therefore, the overall goal of this research was to identify the strategic research priorities needed to advance physical literacy initiatives for individuals with physical disabilities.

The specific objectives of this consensus meeting were to identify gaps in scientific evidence, clinical and community practice, existing tools, and the integration of physical literacy for individuals with physical disabilities; come to consensus on solutions to address these gaps; and future research directions to explore the role of physical literacy for individuals with physical disabilities.

METHODS

The Collaborative Prioritized Planning Process (CP3) (Smith, 2020) was used to guide an online consensus meeting with interdisciplinary and international stakeholders in adapted physical activity. The CP3 is a process-based, solution-focused collaborative, democratic and inclusive approach to facilitate strategic planning, develop organizational priorities, and establish consensus on research directions (Smith, 2020). The meeting was held in English and French, such that all presented information was summarized in its respective second language. All documents prepared and generated throughout the process were made available in English and French. MTR and KLB initiated the consensus meeting with financial support provided by the Center for Interdisciplinary Research in Rehabilitation and Social Integration (Cirris).

PARTICIPANTS

Interdisciplinary stakeholders with various expertise relevant to physical literacy, physical activity and disability were invited to participate, with an aim to capture depth and breadth of relevant expertise while facilitating contribution from all participants (Sabir et al., 2006). An initial list of attendees was identified by core team members from their existing networks. A scan of publications on the topic in Canada also was conducted to identify potential participants. Invited experts included researchers (with academic backgrounds in related health professions such as physiotherapy, kinesiology and occupational therapy, physical education or psychology and research expertise in motor control and learning, adapted physical activity, physical literacy, health policy, development of theory-based interventions or assistive technology), program directors from community organizations who provide adapted physical activities in the community, adapted sport coaches, educators, and individuals with physical disabilities who had experience with physical activity. Participants may have had filled more than one role (e.g., program direction and coaching); therefore, contributions from any one participant may have represented more than one perspective.

PROCESS

Two, 3.5-hour online meetings using the zoom.us platform were held on non-consecutive days in October 2020 to accomplish the four-stage CP3 including a) knowledge synthesis, b) challenge identification and prioritization, c) solution identification, consolidation, and prioritization, and d) action planning. The meeting was facilitated by the developer of the CP3. Bilingual individuals facilitated breakout discussions and summarized information generated during small group discussions which were held in French or English, depending on the small group members' preferences. Using a unique code, participants could access and select their

responses, ensuring a democratic prioritization and decision process. Mentimeter©, a free web-based application accessible through mobile devices or computers, was used to aggregate and prioritize all responses after the meeting.

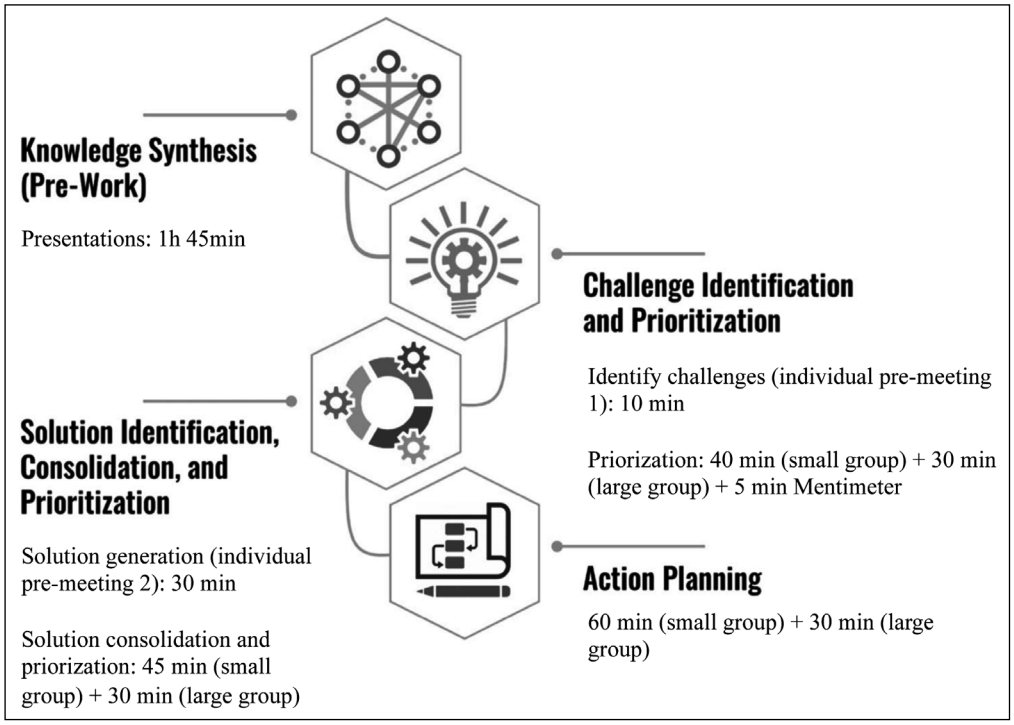

Figure 1 Diagram of the four phases of the Collaborative Prioritized Planning Process (CP^3).

Four-stage CP3 (Figure 1)

i. Knowledge Synthesis: A meeting agenda was circulated five days prior to the meeting that included a brief summary and definition of physical literacy from Margaret Whitehead (Whitehead, 2010). The consensus meeting began with six, 15-minute presentations (see Appendix A) by panel members to summarize existing evidence on physical literacy in adapted physical activity from various contexts, including clinical insights. The knowledge synthesis concluded with a 20-minute open round-table discussion.

ii. Challenge Identification and Prioritization: Five days prior to the meeting, participants were also emailed a Googledoc link and asked to spend a maximum of 10 minutes to add (in point form) their biggest perceived challenges in achieving physical literacy for people with physical disabilities. Participants were asked to think broadly about all the factors which could impact physical literacy, and how these could impact people with physical disabilities. Responses could be in either French or English, and all responses were translated by one of the co-project leads (MR) The identified gaps were summarized on the Googledoc by the CP3 facilitator.

Prior to the meeting, the CP3 facilitator divided participants into groups of 4–5 according to language preference and to diversify the groups based on disciplines and expertise. A bilingual facilitator was assigned to each group. Using Zoom breakout rooms, groups were given approximately 40 minutes to discuss perceived gaps identified on the Googledoc and to generate new challenges. Participants were asked to consider gaps and issues in research evidence and operationalization, clinical and community practice, assessment and training tools, regulatory, educational or institutional issues, or other relevant issues. By the end of the breakout session, each group had prioritized five challenges that were recorded on a Googledoc by the group facilitator. Upon returning back to the main Zoom room, each group was given 5 minutes to summarize their priorities to all participants in both French and English. The five priorities from each group were consolidated by the CP3 facilitator as necessary to reduce duplication and then entered into Mentimeter.

The unique code was provided to participants to access the aggregated list of gaps and issues, and allocated 100 points to distribute amongst the items, with higher allocation of points indicative of higher priority. Points were allocated at the discretion of each participant and there were no restrictions in how points were dispersed across items to

weight priorities. Mentimeter remained active for 24 hours to enable participants time to think about their responses while permitting anonymity to ensure that all voices were heard. At the end of voting, the CP3 facilitator extracted the top six prioritized challenges as indicated by the highest allocation of points on Mentimeter.

iii. Solution Identification, Consolidation and Prioritization: The CP3 facilitator created six separate Googledocs (one for each challenge), which were shared with all participants by email. Separate Googledocs were created in English and French. Over the next six days before the second meeting, participants were asked to visit each challenge (i.e., Googledoc) and take 5 minutes per challenge to write as many solutions as possible directly on the Googledoc. To encourage creativity, participants were asked not to consider feasibility or cost, but instead to think big and '*outside the box*'. Participants were instructed to think long-term and be goal-oriented to imagine what the outcome would be if the issue was addressed. They were encouraged to write in "solution-focused" language (e.g., describe the solution rather than reword the gap). Following solution identification, participants were asked to rank the challenge area they were most interested in working on (and working language of choice) by replying to an email from the CP3 facilitator. This information was used to construct the working groups for day-two and to identify a bilingual facilitator for each of the groups.
At the start of day-two, participants met in the main Zoom room where the CP3 facilitator presented the results of voting and the synthesis of the six priorities. Then in breakout groups of 4–5, participants took 45 minutes to review, consolidate, and prioritize suggested solutions generated on the Googledoc for their allocated challenge, combining ideas when appropriate and discussing the merit of each. Participants were asked to focus on the actual solution (i.e., vision, end-goal) to the problem, not on the steps required to get there and to select one solution that was considered the best for which to develop an action plan. While feasibility could be considered, participants were instructed to focus on the best solution and to not let feasibility influence selecting the best solution. Participants then returned to the main Zoom room where the solutions were presented in both English and French to the entire group for discussion.

iv. Action Planning: In the same small breakout groups of 4–5 as in part iii, participants took about 60 minutes to develop action plans for a research project to achieve the identified solution. A planning worksheet was provided as a Googledoc, and the same bilingual facilitator as in part iii led the activity. The planning worksheet provided a structure to recap the key issues, define the prioritized solution, outline specific goals and objectives, suggest required resources and key stakeholders, recommend the first and next steps, and propose potential sources of funding. The proposed project details for each problem were shared with the entire group in French and English.

The meeting ended with an online survey to gauge how participants would like to be involved in the next research steps. Participants were asked to indicate their name and their intended level of involvement (i.e., lead/co-lead, collaborator, stakeholder/advisor, no role) for each of the research priorities.

RESULTS

Thirty experts participated in the consensus meeting, including 12 interdisciplinary researchers and nine trainees/research professionals (rehabilitation, kinesiology, occupational therapy, physical therapy, health psychology, recreation and education), six directors program managers, or coaches from community sport and physical activity organizations (Adaptavie, Altergo, Parasport Québec, Variety Ontario, Global Athletics), including one international parasport coach, and three individuals with disabilities who had more then 15 years of experience in adapted physical activity and parasports. Table 1 describes the expertise of each group of participants. Participants were from Canada (British Columbia, Ontario, Quebec, and Nova Scotia) and the Netherlands, with representation from eight universities.

KNOWLEDGE SYNTHESIS

A knowledge synthesis of published and ongoing (i.e., non-published) research was provided by stakeholders in physical activity, physical literacy, rehabilitation, and adapted sports on

PRIMARY ROLE	PARTICIPANTS N (%)	EXPERTISE
Person with lived experience parasport adapted physical activity	3 (9.7)	Lived experiences in parasport and adapted physical activities, coaching and mentoring in physical activity and sport.
Directors, program managers, or coaches of community organizations	6 (19.5)	Community-based adapted physical activity, service provision, management, inclusive/ accessible physical activity, inclusive recreation, training and certification, social inclusion, coaching, camps, competition, evidence-based exercise prescription for different clienteles living with functional limitations, and physical literacy.
Undergraduate/ Graduate Students	5 (16.1)	Mobility, physical activity and sport for children and adults with disabilities (ex. manual wheelchair users, cerebral palsy), fundamental movement, physical literacy, measurement, and health.
Postdoctoral trainee/ Research professional	4 (12.9)	Motor development, physical literacy, adapted physical activity for children and youth, physical education, protection of youth in sport, violence in sport, health policies and systems for inclusion of people with disabilities, measurement, and participatory research.
Research Scientist/ University Professor	12 (38.7)	Measuring, understanding, and changing physical activity behaviour in children, youth, and adults and older adults, behaviour change and exercise psychology, motor learning and motor control, assistive technology and wheelchair mobility, social participation and quality of life, translational science, public health, development/validation of rehabilitation measurement tools, physical literacy and physical activity, knowledge translation and implementation.

Table 1 Meeting Participant Characteristics.

* *Note*: Some participants held more than one role (e.g., researcher with a disability and lived experience in adapted physical activity, program director and coach).

research evidence, current clinical and community practices, and related outcomes and guidelines to ensure a comprehensive scope of current evidence. The presentations affirmed a need for further research on physical literacy for individuals with physical disabilities and stimulated the discussion for the meeting.

PERCEIVED GAPS/ISSUES

Participants generated a total of 39 perceived gaps and issues, which were then translated and synthesized into 17 items for voting by the entire group.

PRIORITIZED CHALLENGES

Seventeen perceived gaps and challenges were presented in Mentimeter for point allocation (See Appendix B). The majority of the points (905 out of 1470 points or 62%) were allocated to prioritize the following five challenges: **(A)** Lack of physical literacy education for professionals and other stakeholders (total of 255 points); **(B)** Lack of understanding of what physical literacy is (need a relevant lifespan definition to differentiate between physical literacy, physical activity, and rehabilitation) (total of 232 points); **(C)** Lack of appropriate, community-oriented measurements of physical literacy (total of 176 points); **(D)** Little consensus/scientific data/ normative data about fundamental movement skills (total of 143 points); **(E)** Gap between rehab and community programs.

SOLUTIONS

The collective brainstorming process conducted online between meetings generated between 15–20 solutions for each of the five prioritized challenges. Through discussion and consolidation in small groups, participants identified overlaps and thematic areas of focus for presentation to the larger group. The following five solutions were established to address each challenge:

1) Develop a Massive Online Open Course that includes education and training modules on the various aspects of physical literacy specific to students (physical education and health professions), health care professionals, educators, coaches and researchers.
2) Create a physical literacy measurement toolkit that includes validated outcome tools for all components of physical literacy.

3) Develop a physical literacy resource portal that includes accessible resources for all stakeholders.
4) Create a national database of physical literacy outcomes.
5) Redefine the existing international consensus statement for physical literacy to be more inclusive to individuals with physical disabilities.

ACTION PLANNING

Preliminary notes describing potential future research projects were initiated to fit the five research priorities. Discussions of new research collaborations and partnerships were initiated, and potential project objectives and funding opportunities were summarized. Based on the interests of the 21 participants who responded to the end of study survey, the development of a MOOC and creation of a physical literacy toolkit were prioritized.

DISCUSSION

All participants expressed a perceived importance for advancing knowledge about physical literacy for individuals with physical disabilities. There are various points of discussion when considering next steps to achieve the prioritized five solutions.

CREATE A MASSIVE OPEN ONLINE COURSE (MOOC)

Having received increased attention from healthcare stakeholders, the press and academic research over the last decade (Barnes, 2013; Pappano, 2012), Massive Open Online Courses (MOOC), are defined as 'online courses designed for large numbers of participants, accessible by anyone, anywhere with an internet connection' (Jansen & Schuwer, 2015). MOOCs are available to anyone with no cost and no prerequisite qualifications for completing the online courses (Jansen & Schuwer, 2015). Millions of students around the world choose MOOCs for their unlimited access and self-paced learning options (Lim et al., 2017). Overcoming demographic, economic and geographical constraints, MOOC is an ideal approach to reach a maximum number of learners (Aljaraideh, 2019; Lim et al., 2017). Unfortunately, lack of translational language support, language barriers of the participants, and limited access to the internet in some regions may hinder access to MOOCs (Gulatee & Nilsook, 2016). Ultimately, these barriers could lead to high attrition, with evidence suggesting less than 10% completion of the majority of MOOC (Adams et al., 2013; Koutropoulos et al., 2012; Lim et al., 2017; Reich & Ruipérez-Valiente, 2019). Nonetheless, an experienced instructor has the possibility of providing high quality learning experience for learners, especially for those who are highly motivated (Gulatee & Nilsook, 2016). To ensure an optimal online learning environment, several authors have recommended the integration of open-ended questions, which may maximize the retention of a newly acquired skill (Yuan & Powell, 2013) and the need to study how to maintain a high level of attrition and motivation (Gulatee & Nilsook, 2016).

The development of a MOOC to deliver information about physical literacy for individuals with physical disabilities may be beneficial for several stakeholders, including researchers and health care professionals. Ultimately, these stakeholders are key to promoting the importance of physical literacy. Moreover, the development of modules on physical literacy education, resources to promote adapted physical activity and simplified definitions and the different concepts of physical literacy would allow us to address the needs of different stakeholders.

PHYSICAL LITERACY OUTCOME TOOLKIT

The development of a physical literacy outcome toolkit may serve different purposes for different stakeholders, including researchers, clinicians, educators, and coaches. For example, the availability of a toolkit for researchers may provide an evidence-based resource to improve measurement of physical literacy in individuals with physical disabilities. For coaches, the toolkit may facilitate promotion and awareness of the importance of physical literacy in daily practice. Previous groups have developed adapted physical activity resources (see SCI Get Fit Toolkit and the Ability Toolkit), which consists of guidelines that provide stakeholders (i.e., consumers, health care professionals) with evidence-based tools to encourage physical activity participation (Arbour-Nicitopoulos et al., 2013; Canadian Disability Participation Project,

2018). Despite the inclusion of exercise evaluations and a focus on physical activity, important components of physical literacy (i.e., knowledge, motivation etc.) have not been considered fully to date. Conducting systematic reviews and synthesis of psychometric properties of existing tools may help in the validation or modification of existing tools and may indicate areas for development of new tools.

PHYSICAL LITERACY RESOURCE PORTAL

To facilitate knowledge mobilization of physical literacy among all stakeholders, a single accessible physical literacy resource portal was proposed. Such a portal could provide access to various resources through various types of media, such as videos, which may be accessible for people of all ages. In the current age of social media, sharing videos online to create awareness of the importance of physical literacy may foster interest and share the messages with target populations. In addition to digital media, the portal could house digital and downloadable print-ready media to be distributed, such as posters, infographics and brochures that could be placed in community and clinical settings to promote physical literacy. Although not everyone has access to the internet, it provides a useful platform to host a portal to overcome physical and social barriers (Kimura, 2018).

NATIONAL DATABASE OF PHYSICAL LITERACY OUTCOMES

Development of a national database may provide increasing opportunities for several stakeholders, including researchers and health professionals. In addition to creating a unique source of information on physical literacy, these rich data sources may facilitate research to be carried with a much more profound impact. Cook et al. (2015) (Cook & Collins, 2015) discussed in depth the advantages of using large databases for clinical research. A common use of a dataset on physical literacy outcomes could provide normative data and a summary of the population and physical literacy outcomes. A second advantage could be the identification of risk factors, which could be used as indicators for specific diagnoses. Ultimately, the combination of risk factors and diagnosis could be used to develop predictive models. A large database could also facilitate the observational comparison of outcome between interventions aimed to improve physical literacy in individuals with physical disabilities (Stuart et al., 2013). A physical literacy database gathered over time may provide insight to monitor changes in health and to investigate age-specific indicators (Russek et al., 1997).

INTERNATIONAL PHYSICAL LITERACY CONSENSUS STATEMENT

Consensus statements are usually developed by several stakeholders, including both independent and multidisciplinary panels of experts with the purpose to review the literature and to advance understanding of a specific topic (Services, 2000). An international consensus statement of physical literacy exists to provide a common language for use among all stakeholders (Tremblay, Costas-Bradstreet, et al., 2018), but it needs to be enhanced in terms of inclusivity of individuals with physical disabilities. Ultimately, a consensus statement would facilitate the translation of findings from various topics of research into recommendations for the implementation of physical literacy programs. When successfully implemented, these evidence-based guidelines may improve health outcomes for individuals with physical disabilities (Buchan et al., 2010).

LIMITATIONS

Although participants represented various disciplines with expertise in physical literacy, there were no physical education teachers on the panel. Members of the team had experience in education and training, but the identification of challenges and solutions may have been strengthened by input from educators with current experience working with children with physical disabilities in school systems. Ongoing and future research initiatives should include physical educators to ensure that important aspects of physical literacy are well addressed. Similarly, parents of children with disabilities were not included, nor were children with physical disabilities. However, the nature of an online consensus meeting was found to be suboptimal for children with disabilities. Future research should consider how to include children with disabilities as collaborators in research. The consensus meeting focused on

physical disabilities in general and did not specifically address other disability groups. However, given the two top research priorities were education and measurement, it is likely that the same issues exist in understanding physical literacy for individuals with intellectual and cognitive disabilities. While stakeholders representing individuals with various disabilities participated in the meeting, broader representation of diagnostic groups will be critical in the future to fully understanding physical literacy. Participants included both anglophones and francophones, but not all participants were bilingual. Meeting materials were presented in both languages to facilitate participation; however, informal translations were conducted by the authors without a professional translator. A professional translator was recommended for future meetings to ensure all details are accurately reflected in both languages.

CONCLUSION

To advance knowledge on physical literacy, stakeholders agreed that research should immediately prioritize the development of education and training tools (such as a MOOC) that could have a large reach to many stakeholders, and that a measurement toolkit is critical to guiding research, education, and practice. Longer term priorities include defining a consensus statement for physical literacy, developing accessible resources, and creating a national databases of physical literacy outcomes.

ADDITIONAL FILE

The additional file for this article can be found as follows:

- **Supplementary File.** Appendix A and B. DOI: https://doi.org/10.5334/paah.219.s1

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COMPETING INTERESTS

The authors have no competing interests to declare.

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REFERENCES

Adams, A., Liyanagunawardena, T., Rassool, N., & **Williams, S.** (2013). Use of open educational resources in higher education. DOI: https://doi.org/10.1111/bjet.12014

Aljaraideh, Y. (2019). Massive Open Online Learning (MOOC) Benefits and Challenges: A Case Study in Jordanian Context. *International Journal of Instruction*, *12*(4), 65–78. DOI: https://doi.org/10.29333/iji.2019.1245a

Arbour-Nicitopoulos, K. P., Martin Ginis, K. A., Latimer-Cheung, A. E., Bourne, C., Campbell, D., Cappe, S., Ginis, S., Hicks, A. L., Pomerleau, P., & **Smith, K.** (2013). Development of an evidence-informed leisure time physical activity resource for adults with spinal cord injury: the SCI Get Fit Toolkit. *Spinal Cord*, *51*(6), 491–500. DOI: https://doi.org/10.1038/sc.2013.7

Baker, J., Horton, S., & **Weir, P.** (2009). *The masters athlete: Understanding the role of sport and exercise in optimizing aging*. Routledge. DOI: https://doi.org/10.4324/9780203885512

Barnes, C. (2013). MOOCs: The challenges for academic librarians. *Australian Academic & Research Libraries*, *44*(3), 163–175. DOI: https://doi.org/10.1080/00048623.2013.821048

Best, K. L., Miller, W. C., Eng, J. J., Routhier, F., & **Goldsmith, C.** (2014). Randomized controlled trial protocol feasibility: The Wheelchair Self-Efficacy Enhanced for Use (WheelSeeU). *Can J Occup Ther*, *81*(5), 308–319. DOI: https://doi.org/10.1177/0008417414546743

Buchan, H. A., Currie, K. C., Lourey, E. J., & **Duggan, G. R.** (2010). Australian clinical practice guidelines--a national study. *Med J Aust*, *192*(9), 490–494. DOI: https://doi.org/10.5694/j.1326-5377.2010.tb03604.x

Cairney, J., Dudley, D., Kwan, M., Bulten, R., & **Kriellaars, D.** (2019). Physical Literacy, Physical Activity and Health: Toward an Evidence-Informed Conceptual Model. *Sports Med*, *49*(3), 371–383. DOI: https://doi.org/10.1007/s40279-019-01063-3

Canada, H. R. a. S. D. (2009). *2011–2012 Estimates : Report on Plans and Priorities*.

Canadian Disability Participation Project, C. S. f. E. P., ParticipACTION, & **Healthy Active Living and Obesity Research (HALO) CHEO (RI).** (2018). The Ability Toolkit: A Resource for Parents of Children and Youth with a Disability. Ottawa, ON.

Caspersen, C. J., Powell, K. E., & **Christenson, G. M.** (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep*, *100*(2), 126–131.

Cieza, A., Causey, K., Kamenov, K., Hanson, S. W., Chatterji, S., & **Vos, T.** (2020). Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *396*(10267), 2006–2017. DOI: https://doi.org/10.1016/S0140-6736(20)32340-0

Colley, R. C., Carson, V., Garriguet, D., Janssen, I., Roberts, K. C., & **Tremblay, M. S.** (2017). Physical activity of Canadian children and youth, 2007 to 2015. *Health Rep*, *28*(10), 8–16.

Colley, R. C., Garriguet, D., Janssen, I., Craig, C. L., Clarke, J., & **Tremblay, M. S.** (2011). Physical activity of Canadian children and youth: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. *Health reports*, *22*(1), 15.

Cook, J. A., & **Collins, G. S.** (2015). The rise of big clinical databases. *Br J Surg*, *102*(2), e93–e101. DOI: https://doi.org/10.1002/bjs.9723

Diaz, R., Miller, E. K., Kraus, E., & **Fredericson, M.** (2019). Impact of Adaptive Sports Participation on Quality of Life. *Sports Med Arthrosc Rev*, *27*(2), 73–82. DOI: https://doi.org/10.1097/jsa.0000000000000242

Duclos, B. B. e. É. (2003). Les enfants handicapés et leurs familles In M. d. l'Industrie (Ed.), *Enquête sur la Participaton et les limitations d'activités, 2001*. Ottawa: Statistique Canada, division de la statistique sociale, du logement et des familles

Giblin, S., Collins, D., & **Button, C.** (2014). Physical literacy: importance, assessment and future directions. *Sports Med*, *44*(9), 1177–1184. DOI: https://doi.org/10.1007/s40279-014-0205-7

Ginis, K. A., Latimer, A. E., Arbour-Nicitopoulos, K. P., Buchholz, A. C., Bray, S. R., Craven, B. C., Hayes, K. C., Hicks, A. L., McColl, M. A., Potter, P. J., Smith, K., & **Wolfe, D. L.** (2010). Leisure time physical activity in a population-based sample of people with spinal cord injury part I: demographic and injury-related correlates. *Arch Phys Med Rehabil*, *91*(5), 722–728. DOI: https://doi.org/10.1016/j.apmr.2009.12.027

Ginis, K. A. M., van der Ploeg, H. P., Foster, C., Lai, B., McBride, C. B., Ng, K., Pratt, M., Shirazipour, C. H., Smith, B., & **Vásquez, P. M.** (2021). Participation of people living with disabilities in physical activity: a global perspective. *The Lancet*, *398*(10298), 443–455. DOI: https://doi.org/10.1016/S0140-6736(21)01164-8

Gulatee, Y., & **Nilsook, P.** (2016). MOOC's barriers and enables. *International Journal of Information and Education Technology*, *6*(10), 826–830. DOI: https://doi.org/10.7763/IJIET.2016.V6.800

Handler, L, Tennant, E., Faulkner, G., & **Latimer-Cheung.** (2019). Perceptions of inclusivity: The Canadian 24-Hour Movement Guidelines for Children and Youth. *Adapted Physical Activity Quarterly,* 1; 36(1): 1–18. DOI: https://doi.org/10.1123/apaq.2017-0190

Hands, B. P. (2012). How fundamental are fundamental movement skills? *Active and Healthy Magazine*, *19*(1).

Jansen, D., & **Schuwer, R.** (2015). Institutional MOOC strategies in Europe. *Status Report Based on a Mapping Survey Conducted in October–December 2014*.

Kaioglou, V., & **Venetsanou, F.** (2020). How can we assess physical literacy in gymnastics? A critical review of physical literacy assessment tools. *Science of Gymnastics Journal*, *12*(1). DOI: https://doi.org/10.52165/sgj.12.1.27-47

Kimura, A. K. (2018). Defining, evaluating, and achieving accessible library resources. *Reference Services Review*. DOI: https://doi.org/10.1108/RSR-03-2018-0040

Koutropoulos, A., Gallagher, M. S., Abajian, S. C., de Waard, I., Hogue, R. J., Keskin, N. O., & **Rodriguez, C. O.** (2012). Emotive Vocabulary in MOOCs: Context & Participant Retention. *European Journal of Open, Distance and E-Learning*.

Law, M., King, G., King, S., Kertoy, M., Hurley, P., Rosenbaum, P., Young, N., & **Hanna, S.** (2006). Patterns of participation in recreational and leisure activities among children with complex physical disabilities. *Developmental Medicine & Child Neurology*, *48*(5), 337–342. DOI: https://doi.org/10.1017/S0012162206000740

Lim, V., Wee, L., Teo, J., & **Ng, S.** (2017). Massive Open and Online Courses and Open Education Resources in Singapore. *arXiv preprint arXiv:1708.08743*.

Martin Ginis, K. A., Ma, J. K., Latimer-Cheung, A. E., & **Rimmer, J. H.** (2016). A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. *Health Psychol Rev*, *10*(4), 478–494. DOI: https://doi.org/10.1080/17437199.2016.1198240

Martin, J. J. (2013). Benefits and barriers to physical activity for individuals with disabilities: a social-relational model of disability perspective. *Disabil Rehabil*, *35*(24), 2030–2037. DOI: https://doi.org/10.3109/09638288.2013.802377

Moore, S. A., Sharma, R., Martin Ginis, K. A., & **Arbour-Nicitopoulos, K. P.** (2021). Adverse Effects of the COVID-19 Pandemic on Movement and Play Behaviours of Children and Youth Living with Disabilities: Findings from the National Physical Activity Measurement (NPAM) Study. *Int J Environ Res Public Health*, *18*(24), 12950. DOI: https://doi.org/10.3390/ijerph182412950

Murphy, N. A., & **Carbone, P. S.** (2008). Promoting the participation of children with disabilities in sports, recreation, and physical activities. *Pediatrics*, *121*(5), 1057–1061. DOI: https://doi.org/10.1542/peds.2008-0566

Okoro, C. A., Hollis, N. D., Cyrus, A. C., & **Griffin-Blake, S.** (2018). Prevalence of Disabilities and Health Care Access by Disability Status and Type Among Adults – United States, 2016. *MMWR Morb Mortal Wkly Rep*, *67*(32), 882–887. DOI: https://doi.org/10.15585/mmwr.mm6732a3

Pappano, L. (2012). The year of the MOOC. *The New York Times*.

Ploeg, H., Beek, A., Woude, L., & **Mechelen, W.** (2004). Physical activity for people with a disability: a conceptual model. *Sports Med*, *34*(10), 639–649.

Prevention, C. f. D. C. a. (2020). Disability Impacts All of Us.

Pushkarenko, K., Causgrove Dunn, J., & **Wohlers, B.** (2020). Physical literacy and inclusion: A scoping review of the physical literacy literature inclusive of individuals experiencing disability. *Prospects*, *50*(1–2), 107–126. https://doi.org/10.1007/s11125-020-09497-8

Reich, J., & **Ruipérez-Valiente, J. A.** (2019). The MOOC pivot. *Science*, *363*(6423), 130–131. DOI: https://doi.org/10.1126/science.aav7958

Rimmer, J. A., & **Rowland, J. L.** (2008). Physical activity for youth with disabilities: a critical need in an underserved population. *Dev Neurorehabil*, *11*(2), 141–148. DOI: https://doi.org/10.1080/17518420701688649

Rimmer, J. H., Riley, B., Wang, E., Rauworth, A., & **Jurkowski, J.** (2004). Physical activity participation among persons with disabilities: barriers and facilitators. *American journal of preventive medicine*, *26*(5), 419–425. DOI: https://doi.org/10.1126/science.aav7958

Rocchi, M., Routhier, F., Latimer-Cheung, A. E., Ginis, K. A. M., Noreau, L., & **Sweet, S. N.** (2017). Are adults with spinal cord injury meeting the spinal cord injury-specific physical activity guidelines? A look at a sample from a Canadian province. *Spinal Cord*, *55*(5), 454–459. DOI: https://doi.org/10.1038/sc.2016.181

Russek, L., Wooden, M., Ekedahl, S., & **Bush, A.** (1997). Attitudes toward standardized data collection. *Phys Ther*, *77*(7), 714–729. DOI: https://doi.org/10.1093/ptj/77.7.714

Sabir, M., Breckman, R., Meador, R., Wethington, E., Reid, M. C., & **Pillemer, K.** (2006). The CITRA research-practice consensus-workshop model: exploring a new method of research translation in aging. *Gerontologist*, *46*(6), 833–839. DOI: https://doi.org/10.1093/geront/46.6.833

Saxena, S., & **Shikako Thomas, K.** (2020). Physical literacy programs for children with disabilities: a realist review. *Leisure/Loisir*, *44*(2), 199–224. DOI: https://doi.org/10.1080/14927713.2020.1760119

Services, U. D. o. H. a. H. (2000). *U.S. Department of Health and Human Services: Office of Disease Prevention and Health Promotion— Healthy People 2010*.

Shikako-Thomas, K., Majnemer, A., Law, M., & **Lach, L.** (2008). Determinants of participation in leisure activities in children and youth with cerebral palsy: systematic review. *Physical & occupational therapy in pediatrics*, *28*(2), 155–169. DOI: https://doi.org/10.1080/01942630802031834

Smith, E. M. (2020). *Collaborative Prioritized Planning Process – Guidance Document*.

Stathokostas, L., Speechley, M., Little, R. M., Doerksen, S., Copeland, J., & **Paterson, D. H.** (2017). Long-term Evaluation of the "Get Fit for Active Living" Program. *Can J Aging*, *36*(1), 67–80. DOI: https://doi.org/10.1017/s0714980816000635

Stuart, E. A., DuGoff, E., Abrams, M., Salkever, D., & **Steinwachs, D.** (2013). Estimating causal effects in observational studies using Electronic Health Data: Challenges and (some) solutions. *EGEMS (Wash DC)*, *1*(3). DOI: https://doi.org/10.13063/2327-9214.1038

Stuart Morris, G. F., Brisebois, L., & **Hughes, J.** (2018). *A demographic, employment and income profile of Canadians with disabilities aged 15 years and over, 2017*. Canada: Statistics Canada.

Tremblay, M. S., Carson, V., Chaput, J. P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., LeBlanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., … Zehr, L. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *Appl Physiol Nutr Metab*, *41*(6 Suppl 3), S311–327. DOI: https://doi.org/10.1139/apnm-2016-0151

Tremblay, M. S., Costas-Bradstreet, C., Barnes, J. D., Bartlett, B., Dampier, D., Lalonde, C., Leidl, R., Longmuir, P., McKee, M., Patton, R., Way, R., & **Yessis, J.** (2018). Canada's Physical Literacy Consensus Statement: process and outcome. *BMC Public Health*, *18*(Suppl 2), 1034. DOI: https://doi.org/10.1186/s12889-018-5903-x

Tremblay, M. S., Longmuir, P. E., Barnes, J. D., Belanger, K., Anderson, K. D., Bruner, B., Copeland, J. L., Delisle Nyström, C., Gregg, M. J., Hall, N., Kolen, A. M., Lane, K. N., Law, B., MacDonald, D. J., Martin, L. J., Saunders, T. J., Sheehan, D., Stone, M. R., & **Woodruff, S. J.** (2018). Physical literacy levels of Canadian children aged 8-12 years: descriptive and normative results from the RBC Learn to Play-CAPL project. *BMC Public Health*, *18*(Suppl 2), 1036. DOI: https://doi.org/10.1186/s12889-018-5891-x

Trost, S. G., Blair, S. N., & **Khan, K. M.** (2014). Physical inactivity remains the greatest public health problem of the 21st century: evidence, improved methods and solutions using the '7 investments that work' as a framework. *Br J Sports Med*, *48*(3), 169–170. DOI: https://doi.org/10.1136/bjsports-2013-093372

Whitehead, M. (2010). *Physical literacy: Throughout the lifecourse*. Routledge. DOI: https://doi.org/10.4324/9780203881903

Wright, A., Roberts, R., Bowman, G., & **Crettenden, A.** (2019). Barriers and facilitators to physical activity participation for children with physical disability: comparing and contrasting the views of children, young people, and their clinicians. *Disabil Rehabil*, *41*(13), 1499–1507. DOI: https://doi.org/10.1080/09638288.2018.1432702

Yuan, L., & **Powell, S.** (2013). MOOCs and open education: Implications for higher education.

Zimmer, C., Staples, K. L., & **Harvey, W. J.** (2016). Fundamental movement skills in children with and without movement difficulties. *Journal of Motor Learning and Development*, 4(2), 324–343. DOI: https://doi.org/10.1123/jmld.2016-0001

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