

Review

Operationalizing physical literacy for learners: Embodying the motivation to move

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Abstract

Physical literacy is a concept that is expected to encompass the mind and body in an integrated way to explain, promote, and help sustain human beings' fundamental function: movement. According to Whitehead (2010), physical literacy is defined by motivation, especially by competence-based and interest-based motivation. This point of view is consistent with vast amount of research evidence on children and adolescents' physical activity behavior. In the article I attempt to interpret and operationalize physical literacy from a perspective that children's motivation in physical education is both an innate mental disposition and an acquired/learned attribute. Particularly I rely on the conceptual learning theory and motivation regulation mechanisms of the self-determination theory to argue that in physical education, children should experience tasks that inspire them to embody competence and interest along with self-regulation strategies necessary for developing and sustaining the motivation to move.

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1. Introduction

Physical literacy is a concept that embraces an integrated view of the mind and body to explain, promote, and help sustain human beings' fundamental function: movement. Its adoption as the ultimate goal for physical education (PE)¹ has broadened a possibility for children to learn and experience physical activity through this integrated mind-body perspective. According to Whitehead,² a physically literate individual should be able to demonstrate the following attributes when engaged in physical activity: motivation, skillfulness and efficiency, intelligence about the environment, confidence, sensitivity to social context, and knowledge about functions (e.g., health) of the physical movement. Among these attributes, motivation serves as a foundation on which other attributes function. Whitehead² thought physical literacy is defined by motivation, "Physical literacy can be described as a

disposition characterized by the motivation to capitalize on innate movement potential to make a significant contribution to the quality of life" (p. 12).

This point of view is consistent with vast amount of research evidence on children and adolescents' physical activity behavior. In the following sections, I will briefly discuss sources of motivation for physical activity. Then I will focus on the importance of helping children embody motivation from a perspective that children's motivation for physical activity is both an innate mental disposition and an acquired/learned attribute. Lastly I will argue motivation cannot be embodied by itself; it must be acquired along with the development of competence in both cognitive and physical domains. In other words, PE should, first and foremost, help children develop knowledge/skills and motivation simultaneously to help them become physically literate.

2. Sources of motivation for physical activity

There are five heavily researched motivation constructs in K-12 PE.³ They are achievement goals (conceptualized as both

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mental dispositions and classroom climates), expectancy-values, interests, self-efficacy, and self-determination. These constructs are indicative of the respective sources of motivation that children and adolescents are likely to rely on to engage in physical activities in PE. Although in research these constructs are conceptualized and measured in different ways, some share common sources and others derive from unique ones.

One most influential source of motivation that underlines several constructs is perceived competence. Defined as a subjective belief of own ability to succeed,⁴ perceived competence is considered a powerful source for achievement goals, expectancy beliefs, and self-efficacy. It is a common motivation platform for children to form achievement goals,⁵ expectancy beliefs,⁶ and self-efficacy.⁷ Perceived competence drives one's initial motivation to engage in an activity and continued motivation to put forth effort during the activity.⁸ This is especially true for children and adolescents.⁴ Research studies have shown that the differentiated perceived competence in children and adolescents is directly associated with their behavior in PE settings. In general, children with positive perceived competence tend to display high motivation.⁹

Interest is another powerful motivation source for children and adolescents. Conceptually, interest can be understood as personal interest and situational interest.¹⁰ Personal interest is a relatively stable mental disposition toward a domain, which relies on a high level of knowledge about the domain and personal valuation of the activities in the domain such as value and importance. Situational interest, on the other hand, is a temporal mental state that derives in a given situation where the physical activities offer novelty, challenge, and instant enjoyment.¹¹ Needless to say that although situational interest is of high utility value in a teaching-learning setting due to its power to elicit instant motivation from children to participate in activities they otherwise are not interested in,¹² personal interest in routine physical activity participation should be an attribute of physical literacy.

The third powerful source of motivation is the psychological needs that all human beings are keen to fulfill in their life. According to Deci and Ryan,¹³ the needs for autonomy, competence, and relatedness are the fundamental sources for human motivation and the fulfillment of the needs determines individuals' self-determined motivation. To fulfill the needs, human beings are to be motivated either through intrinsic or extrinsic channels afforded to them in life. The comprehensive conceptualization of the relations among the needs, their associations with intrinsic and extrinsic motivation and the mechanisms of regulating the mental processes of motivation form the overarching self-determination theory. An important message from the self-determination theory is that humans rely on both intrinsic and extrinsic sources to develop and sustain motivation. In a controlled environment such as school, motivation is most likely to be regulated through external controlling mechanisms and incorporating strategies. To satisfy children's three basic needs may minimize possible negative impact of the controlling mechanisms on their motivation.¹⁴

The above motivation sources have been found to have impact on children and adolescents' motivation in PE.³ The research evidence, due to limitations in empirical research methods, also portrays an island effect; that is: the findings on each motivation construct are to be understood as though the motivation source for the construct is the only one for motivation. Implicitly, the island effect suggests that children and adolescents are experiencing only one mental process for motivation in PE.

It can be speculated, however, that there can be multiple motivational channels at work in any given moment in a physical activity setting. The multiple motivational channels might lead to a fluid motivational stream for a child or adolescent to adapt. The adaptive mental processes will be likely to blur the boundaries of process-oriented (e.g., intrinsic) and product-oriented (e.g., extrinsic) motivation.¹⁵

To embody physical literacy requires a different understanding of the motivation processes. The attributes of physical literacy suggest that physically literate individuals engage in physical activities mostly for the intrinsic values such as enjoyment, self-actualization opportunities, and a sense of competence or efficiency.² Thereby, they are able to "identify the intrinsic value of physical activity; overcome the need to justify physical activity as a means to other ends; spell out a case for lifelong participation in physical activity;" (p. 5). For children and adolescents to become physically literate, therefore, motivation has to be learned explicitly along with knowledge and skill content for them to appreciate the intrinsic values and lifelong meaning of physical activity participation.

3. Motivation processes for physical literacy

Children are motivated for physical activity especially in PE settings. Yet, the motivation, measured in all the motivation constructs, declines over the years when they grow older.³ Although research studies documented the decline using age or school level or grades as the indicator, these variables should not be interpreted as *causes* of the decline due to the descriptive and/or correlation nature of these studies.³ It is clear that the decline is coupled with the time when children and adolescents are gaining more experiences in PE, which may or may not be the right experiences, through the process of schooling. As Chen and Ennis¹⁶ summarized that knowledge and skill learning in PE often is defined vaguely in the school curriculum. When the learning goal is not clearly defined, the motivation is not likely to be oriented toward learning meaningful content. In other words, the children may be motivated for something else.

Learning in PE has long been defined on behavioral terms as observable behavior change that exclusively is judged on skill performance. This perspective omits an important attribute of learning: the necessary conceptual guidance to behavioral change/performance. A reconceptualization of learning has led to a revision of the concept of learning in both education¹⁷ and PE.¹⁸ The most critical indication of learning, by and large, is the change of conceptions about the entity under study. In other words, learning in both cognitive and

physical domains involves conceptual change. In another influential learning theory, the domain learning theory, learning is defined in the similar way. Alexander and Murphy¹⁹ argued that all learning process and achievement involve two aspects of human behavior: cognitive and behavioral engagement. Even in the classroom, physical engagement is a necessary condition for learning the cognitive content. In PE, *vice versa*, it has been long established that cognitive engagement is key to behavioral change such as motor skill learning.²⁰

The process of learning, based on the conceptual change theory, involves changing learners' naïve mental models (misconceptions about a phenomenon) to a scientific mental model (scientifically correct understanding/conception about the phenomenon).¹⁷ Physical literacy calls for meaningful embodiment of ALL aspects that are required by active participation in physical activity, including a sound mental model with scientific knowledge, adequate motor skills relevant to the types of physical activity to be engaged, appropriate fitness levels enabling effective participation, and sustained motivation for continued exertion of effort. To change children's and adolescents' misconceptions of physical activity requires a concerted effort to target and address ALL aspects of their life related to physical activity participation in various settings. This demands educators to understand the complexity of motivation processes in different physical activity settings, especially in PE.

Recent research on children motivation in PE has begun to show two strands of findings important to developing strategies to help embody motivation in children. One is that externally controlled regulation processes may help children become their own change agents leading themselves in developing and sustaining a physically active lifestyle. Research based on the self-determination theory repeatedly demonstrate the possibility that individuals might adopt external regulation, introjected regulation, identified regulation, or integrated regulation mechanisms to stay motivated in their given physical activity settings.²¹ Adopting the external regulation mechanism, children become motivated when an external contingency (award or punishment) system is imposed for them to receive either an award or a punishment depending on their performance in learning. When the introjected regulation mechanism is adopted, children become motivated to establish a sense of self-worth or to rid of a sense of guilt or to fulfill an obligation that a significant other has given to them. The identified regulation mechanism is regarded as the threshold of autonomy²² where the children become motivated for meaningfully identifying self to the behavior. They are able to connect self somehow to the behavior in a positive way, which prompts them to engage in the behavior as part of their own desire. In other words, they are moving away from "I have to do" but moving to "I want to do". The last mechanism, integrated regulation, is considered by researchers as the beginning stage of embodying or internalizing extrinsic motivation. Individuals that adopt this mechanism for motivation realize the benefits and significance of a behavior to their life and *actively* regulate his/her environment and

lifestyle to incorporate the behavior as part of his/her identity, environment, and lifestyle.²³ Quite a few studies have shown the promise of the self-determination approaches to motivating children in PE²⁴ despite concerns about the schools' norm prohibiting the PE context from becoming a true autonomy supportive environment to maximize the theory's potential.²⁵ These research findings have demonstrated a level of complexity of helping children embody the motivation processes in PE.

The second strand of findings further raises the awareness of the complexity. Taking motivation as a co-product of PE content and children mental processes, Chen and his colleagues²⁶ have begun to notice the issue of motivation-content specificity. Guided by the expectancy-value theory, Chen et al.²⁶ tested children's expectancy-value motivation in three content environments: a cardio-respiratory fitness unit, a muscular capacity unit and a skill/game unit. They found that the intrinsic values (enjoyment, interest of the content) were equally appreciated by the children across all three content environments. However, motivation based on the expectancy beliefs, attainment value (importance), and utility value differed across the units with statistical significance, suggesting the impact of content choices on children motivation in these PE lessons. Ding et al.²⁷ replicated the study with a sample of middle school students in China. In addition to the expectancy-value motivation, they also included situational interest in the study. Data from a random sample of 346 students confirmed the hypothesized causal inferences that showed firm connections between the content types/outcomes and the motivation sources. In particular, situational interest was found motivating students to engage in physical activities, expectancy beliefs motivating students in skill learning, and task values motivating them in learning fitness-related cognitive knowledge.

These findings seem to caution us to be careful in terms of operationalizing physical literacy for the purpose of instruction. Although physical literacy should be taken as a holistic concept for the embodiment process, teaching children to do so may require logical analysis of the PE content and the relations between physical tasks, cognitive tasks, and motivation processes in order to be effective. In the same token, a challenge of becoming physically literate is that behavioral change in the physical domain overrides the cognitive change because the former is visible and often measurable and the latter is usually invisible for the naked eye and difficult to measure in physical movement. The extent to which the embodiment of knowledge, behavior, and motivation can be manifested in behavior measures requires using physical activity indicators meaningful for children to make cognitive connection with other indicators of learning such as skill proficiency, knowledge acquisition, and/or motivation strategies. For example, one of the physical activity measures is metabolic equivalent (MET). MET can be used as a physiological intensity indicator which can be used in understanding skill learning, game playing, health-benefit of physical activity, *etc.* Learning to connect physical intensity with these indicators is a cognitive process. Making the connection is worth teaching because it

will help children develop a holistic conception about the many faceted nature of physical activity PA, which is consistent with the goal of physical literacy.

A recent study²⁸ that employed MET and total caloric expenditure to analyze the impact of student personal factors (age, gender, BMI) and PE lesson factors (length and content types) on in-class physical activity can be an example of the potential to connect person-environment in PE. Using a hierarchical linear model design, the researchers were able to show the impact of personal factors and lesson factors separately. The findings clearly showed that the two sets of factors function independently in determining physical activity levels (which could be understood as benefit levels from physical activity as well). Imagine the impact on connecting these facts at cognitive level for children if the results had been conveyed back to the students as *content* of learning in PE. Would that increase the possibility for the students to embody or internalize the cognitive information and used them to guide their future physical activity participation? I will say yes.

4. Motivation: part of learning in physical literacy

From the psychological perspective, motivation is an innate, autonomous mental process.²⁹ From this perspective, motivation relies on internal mental processes of needs, emotions, and cognitions. These processes, particularly the cognition process, are fueled by mental events such as thoughts, beliefs, and expectations. Most of the mental events are derived from information that an individual absorbs from the immediate environment and upon which the individual determines satisfaction of needs, emotions, and cognitions.

In an achievement setting where there is a goal to be achieved or a behavior to be developed and sustained, the inner process of motivation is most likely directed and affected by external forces. One of the two common approaches to motivation is through a behaviorist approach where external forces (e.g., teachers, coaches) use effective incentives to *condition* the motivation processes for individuals to achieve a goal (e.g., repeat a shooting drill until a certain number of baskets are made) or adopt a desirable behavior (e.g., continue to exercise to lose weight). This approach, according to Reeve,²⁹ views motivation as “something that can be produced by providing direction” (p. 3) to guide the individual toward a desirable outcome and away from the undesirable. The other approach views motivation as a developmental process where the autonomous innate processes are central to motivation. External forces provide opportunities for individuals to *acquire* and practice their mental capacities of self-regulation to “generate motivation from within”.²⁹

These approaches appear to share a common assumption: motivation, although an innate, autonomous mental process, can be learned in situations where external forces provide opportunities for individuals to best use their inner motivational resources.²⁹ This perspective is consistent with that of physical literacy where motivation is considered a critical part of knowledge base that can be learned. In other words, physically literate individuals understand their mental

resources cognitively in both declarative and procedural forms and are able to use the resources to fuel their motivation for physical activity. To help children learn how to motivate themselves and each other, we should incorporate a few critical sources of motivational information in the curriculum and learning tasks that research has shown their critical role in developing and sustaining motivation. These are competence-related information, interest-based information, and regulation-related information.

4.1. Competence

One single motivational source most children and adolescents rely on in PE is the information associated with the degree to which they understand their physical competence. According to Harter,⁴ children develop their perceptions of competence in four areas: cognitive, physical, social, and general self-worth. In most research in the physical activity domain, children’s perceived physical competence is the focus and is often studied separately from others. In education, perceived competence is addressed separately; perceived cognitive competence is nurtured in the classroom instruction of academic content, while PE is the place for children to develop sound perception of physical competence. Research studies have been supportive of the separate conception of perceived competence³⁰ and advocated for strategies that address children competence issues in a separate manner.

However, to help children become physically literate in PE we must recognize the need to take a holistic view of the moving children and motivate them as such. As Whitehead² stressed, physical literacy can only be achieved as actualized embodiment of all attributes of physical activity with minimal influence from the traditional mind-or-body dualism. In fact, physical educators have recognized this holistic perspective as necessity for quite some time. At the curriculum level, concept-based models such as *Fitness for Life*,³¹ *Teaching Games for Understanding*,³² and *Children Moving*,³³ are examples of the attempt to adopt the sound-mind-sound-body holistic approach to PE.

Instructionally, strategies to enhance PE students perceived competence for motivation purposes have been incorporated in physical activity task design and assessment. For example, differentiated learning methods have been used in PE to engage children in assessing appropriate competence by choosing the most appropriate level of difficulty in practice. Fig. 1 is a differentiated learning task card that illustrates easy, medium, and difficult push-up exercise for children.

One of the most important sources of competence information comes from teacher assessment. For example, a study using a path-analysis showed a positive path from fitness test scores to positive perceived physical competence in Finnish middle school students,³⁴ indicating a close tie between cognitive understanding, or at least awareness, of assessment outcome and the development of perceived physical competence. Rink³⁵ has emphasized the importance of providing students ample opportunities to experience success in physical tasks to help them develop and sustain positive perception of

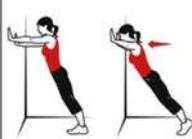
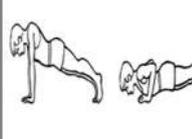
Push Ups		
Easy	Medium	Hard
<p>Wall Push Up Feet two steps from the wall 30 (rest & repeat)</p>	<p>Modified or Knee With straight back 10 (rest & repeat)</p>	<p>Regular With straight body 5 (rest & repeat)</p>
		

Fig. 1. Example of a differentiated learning task card.

competence in the physical domain. It is recommended that students be given formative assessment feedback frequently. Rink³⁵ suggested it is crucial in task design to consider providing a high success rate (~80%) for all children in PE to protect and further develop their positive perception of competence and motivation.

4.2. Interest

There is no doubt that most children and adolescents are intuitively motivated by interests.¹⁰ In the academic environment where most learning tasks may not be interesting to children, teachers' careful planning of learning tasks can catch and hold students' situational interest.³⁶ Chen and his colleagues have conducted extensive research on situational interest in PE.^{11,12,37-40} The findings have confirmed that situational interest resides in the cognitive challenges that a physical activity can offer to children and adolescents. It has been revealed also that strong situational interest, a temporal mental state, is unlikely to be influenced by activity intensity, gender, personal interest (students' mental dispositions of preferences), and skill levels.

Theoretically the above empirical research findings can be used as a platform on which a strong motivation source can be incorporated in designing the PE curriculum and learning tasks. Findings from motivation specificity research²⁷ support this observation. In an experimental study, Sun^{41,42} manipulated situational interest by contrasting the content based on active video games (exergames) and the conventional game content to examine the effects of situational interest in elementary school PE. The findings demonstrated again the motivational power of the active video games that were perceived highly situationally interesting. The findings reiterate what Shen et al.¹² found earlier that situational interest motivates children the best even for those who do not have personal interest in the PE content to begin with.

As a temporal mental state, situational interest has a fatal weakness that prevents it from exerting a continuous motivation impact on individuals. Using the car engine as an analogy,

it can be turned on quickly when the key is turned to the on position. That is, when a physical task is presented to children with novelty, cognitive challenge, attention demand, exploration opportunity, and instant enjoyment, children will become motivated.³⁷ But when the car key is turned to the off position, the engine is off instantly. That is, when the task is over, the situation-based motivation diminishes just as quickly. In other words, situational interest is difficult to sustain for long-term motivation. Sun's study⁴² clearly showed that the motivational power of exergames can diminish over time. Children in the study gradually lost situational interest when continuing with some games. Sun⁴² postulates that to build a long-term motivation through situational interest, it is necessary to include in the curriculum a relational or bridge connection between the task of interest and the "sense of mindfulness" of the learner. This can only be accomplished, according to Sun, through carefully planned educational experiences. In other words, the motivation elicited from experiencing situational interest must be embodied (that is, internalized) through deliberate learning. Otherwise the motivation processes will be difficult to be embodied as part of becoming physically literate.

4.3. Self-regulation

Sustained motivation is regulated by the individual him/herself. Embodied physical literacy will not exist if the individual is unable to motivate self to engage in physical activity through regulating own behavior. Whitehead² reasoned, on experiential accounts, that lack of motivation is the primary reason for the prevalence of physical inactivity. Most people's experiences in the physical activity domain may not be the most favorable experiences in life and the experiences usually are negative to the development of self-confidence and interest in physical activity. Whitehead² further concluded that physical literacy dictates that competence/ability based self-confidence should be celebrated. She further predicted, "Motivation essentially arises from the confidence and self-esteem acquired through experience ... which has been perceived as successful and has been recognized as such" (p. 31). In other words, when individuals, especially children, perceive themselves as being successful, this perception should be protected, recognized, and celebrated. This conclusion is consistent with findings of psychological research on perceived competence.

To instill physical literacy in children, Whitehead² believed that another primary motivation source is particularly important: "... curiosity to explore and interact with every aspect of the environment" (p. 31); which, on psychological terms, can be understood as situational interest. Nurturing this curiosity is to assist children develop intrinsic motivation to physical activity. Competence-based positive experiences aide the process of becoming intrinsically motivated for physical literacy. Whitehead² also anticipated that not every experience can be positive for everyone, especially for children. When intrinsic motivation is lost, "forms of extrinsic motivation may be needed to initiate a return to being active" (p. 32). The goal of adopting extrinsic motivation approaches, however, should be

to “offer opportunities for success, to nurture interest, and to re-ignite a drive to capitalize on physical potential”.

Assisting children to internalize both positive competence-based experiences and/or situational interest of physical activities requires physical educators to strategically and skillfully regulate their motivation and behavior. According to Ryan and Deci,⁴³ in an externally controlled environment such as schools, it is necessary for individuals to develop a sense of self-regulation rather than a sense of being controlled. Thus self-regulation is “the energization and guidance of behavior on the basis of integrated awareness, informed by basic needs” of autonomy, competence, and relatedness.⁴³ Externally controlled regulation mechanisms should be based on the goal of energizing and guiding an internalization process where the individual will identify with the value of the expected behavior.

The self-determination theory¹³ has laid out important aspects of internalizing external values in four external regulation mechanisms for extrinsic motivation. These mechanisms include external regulation which solely relies on the motivation power of rewards; introjected regulation which instills an externally imposed obligation as the primary motivation source; identified regulation that motivates individuals through accepting externally recognized values of the behavior; and integrated regulation which provides opportunities for individuals to exercise autonomy to show ownership of motivation. Sun and Chen²⁵ argued that as a core idea of the self-determination motivation theory, these regulation mechanisms form “... an operational platform for educators to provide planned experiences for students to become self-regulated learners” (p. 376).

It seems plausible to suggest that a physically literate person should be characterized by self-regulated motivation for physical activity. She is able to adopt various self-regulation strategies to continuously motivate self to participate physical activity. For example, a scenario may be an overweight child is initially motivated for physical activity by the external reward of losing excessive body weight. When the experiences instill a sense of obligation to become self-responsible for health, the child develops an introjected behavior regulation that motivates her to overcome barriers to continuous participation. If the physical activity experiences are educational rather than purely recreational, the child learns the values and benefits of physical activity for health and quality of life and develops knowledge and physical competence necessary for engaging in the physical activities valued and beneficial. Thereafter, she identifies with the values and further integrates the values as his/her own; and she becomes able to sustain the integrated motivation for continued participation in physical activity.

Currently, the above theorizing lacks empirical support. The reward structure in schools is often incongruent with the theorizing. Research evidence, on the other hand, has demonstrated repeatedly the detrimental effects of such reward structures.⁴³ In PE it is commonplace to find such reward structures that rewards (both tangible and intangible such as verbal) are based on win/loss record, fitness test scores, and/or grades. As Chen⁴⁴ observed, one area that empirical evidence is urgently needed is the motivational functions of reward structures often used in PE. Particularly, we need a better

understanding of effects of using controlling reward and using informational reward systems. The understanding will certainly assist us in developing instructional strategies to help children internalize extrinsic motivation.

In addition to using the self-regulation mechanisms in teaching, we should consider teaching the mechanisms to children in order for them to understand the extrinsic motivation process. Should it be part of the curriculum to teach children that weight loss is an external reward (external regulation) and over-relying on receiving the reward can be detrimental to their motivation for physical activity? Should we teach students that they should feel guilty if they have skipped an exercise session that they should attend (introjected regulation) and they should make it up? After all, a physically literate person should be knowledgeable about these motivation issues around physical activity participation and be able to adopt the most appropriate motivation strategy at the moment for him/herself.

5. Summary

Adopting the ideal of physical literacy as the ultimate goal of PE requires a conceptualization of the moving child as a holistic person who is moving to learn to become a knowledgeable and intelligent mover. One determining characteristic of a physically literate person is a strong motivation for physical activity. The motivation can be intrinsic as well as extrinsic, meaning the person is able to motivate him/herself to participate in physical activity using a strategy that is most meaningful at the moment. In this sense, motivation should be considered a process that involves a functioning mind along with a moving body, operating together with knowledge of competence, interest, environment, and purpose of action. Such a motivation is learned. A key to learning to become motivated is an understanding of the internalization process where, in the case of school PE, children experience physical activity tasks to embody competence and interest along with self-regulation strategies necessary for developing and sustaining the motivation to move.

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