

Advancing the Debate on 'Fitness Testing' for Children: Perhaps We're Riding the Wrong Animal

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Assessment and evaluation are the cornerstones of the education and health fields. Assessment provides professionals with measures of educational achievement, health and functional status, and acts as an operational starting point for curricular and/or treatment planning and allows professionals to gain an understanding of the child to make informed decisions regarding education or treatment. Evaluation is woven into the fabric of North American schools, be it spelling tests, math tests, an evaluation of a child suspected of having a learning disability, or fitness testing in physical education class. There is little or no debate regarding the importance of assessment and evaluation in the cognitive domains in school (e.g., literacy and numeracy); however, assessment in physical education remains controversial. Physical and health education is mandated in most schools, just like spelling, math, science, and language arts; yet there is resistance to assessment in physical education. The purpose of this article is to further the debate surrounding fitness testing in schools.

Fitness testing of school children in North America began approximately 50 years ago (19). Whether fitness testing should continue, and for what purpose, is a controversial debate that has persisted both in the scientific literature and physical education circles for decades (10,11,18,22). Rowland's (22) article "The Horse Is Dead; Let's Dismount" reignited the debate in the peer reviewed literature. He suggested that the practice of fitness testing in children should be stopped because the results are meaningless and not used appropriately. Subsequent papers have continued this discussion using the horse analogy (10,18). Cale and colleagues' article (10) "More Than 10 Years After "The Horse Is Dead . . .": Surely It Must Be Time to "Dismount"?!" agreed with Rowland's original position, citing methodological concerns, lack of evidence relating physical activity, health and fitness, and the potential that fitness testing actually does harm. Liu's (18) article titled "Youth Fitness Testing: If the "Horse" Is Not Dead, What Should We Do?" points out that the "horse is still not dead" because fitness testing in school is a common practice across North America; however, there is a movement against the practice (18). The debate continues today.

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The Fitness Testing Debate

One of the fundamental arguments against fitness testing in children is that fitness in children is dependent on so many factors that cannot be modified in physical education. Physical growth, biological maturation and behavioral development are complex and interacting contributors to physical fitness in children (21). While we acknowledge the fact that physical fitness in children is a complex construct that is the result of the interaction of several components, including those beyond the scope of physical education, it is interesting to note that this same argument could be made in other subjects where assessment is regularly conducted and almost universally accepted. For example, literacy in elementary school-age children is regularly assessed using standardized and nonstandardized methods yet recent research indicates that the home environment, parental literacy levels, familial resources, even genetics—all factors outside of the control of the classroom—relate to the literacy levels in children (1,9,26). In fact, the American Academy of Pediatrics in a position statement on *Physical Fitness and Activity in Schools* stated that “schools are in a uniquely favourable position to increase physical activity and fitness among their students” (pp. 1156; 3). Is the argument that physical education does little to impact the health and fitness of students because health and fitness are impacted by so many factors outside the control of physical education class reason enough to prevent assessment of curricular goals and outcomes? If so, why does this reasoning apply only to physical education outcomes?

In the past it has been argued that fitness should not be assessed because it had not been demonstrated to be related to childhood health. Twenty years ago, Blair (6) proposed a conceptual model which linked childhood physical activity levels to childhood health, adulthood exercise, and adulthood health. The triangulation between physical activity, fitness and health has historically been difficult to characterize, possibly due to difficulties in appropriately and accurately quantifying each of the three elements. In addition, mortality from chronic disease is rare during childhood; therefore, the relationship between physical activity/fitness and mortality has been discussed less in children when compared with adults (6). The assumed resilience of youth has perhaps resulted in a false sense that adequate fitness during childhood is less important than in adulthood. However, evidence is building that suggests it is time to become more concerned about childhood physical activity habits and fitness levels.

The relationship between childhood fitness and childhood health has recently been investigated in the European Youth Heart Study (20). This multisite, multinational research study has shown that cardiorespiratory fitness, as measured by a maximal cycle ergometer test, relates more strongly to cardiovascular disease risk when compared with physical activity levels in children and youth aged 9 and 15 years (7). The odds ratio for having a clustered cardiovascular disease risk score (e.g., blood pressure, blood lipids, body fat, fasting glucose, insulin resistance) decreases as physical activity increases in a dose response manner as well (4). The question of what is more important, physical activity or fitness (process or product), is less important than the over-arching message that both are interrelated and both influence the overall health of a child. In fact, the 2008 United States Physical Activity Guidelines Advisory Committee Report (21) found, based on an extensive review of the evidence, that “physical activity is positively related

to cardio-respiratory fitness in children and youth, and both preadolescents and adolescents can achieve improvements in cardio-respiratory fitness with exercise training” (pp. 501; 21).

The evidence indicates that childhood fitness is important for childhood health (21). Therefore, the practice of fitness assessment in children provides extremely valuable information. However, recently it has been suggested that the focus should be on increasing the physical activity behaviors of children rather than focusing on fitness. The debate evolves.

Physical Activity, Fitness or Both?

Physical fitness in children and adolescents has been linked to fitness, physical activity and health outcomes in adulthood (17). By contrast, the links between childhood and adulthood levels of physical activity have not been as strong (16). It is important to consider the role that measurement has played in this discrepancy. For example, robust and validated tools to measure fitness in laboratory and field settings have been widely available for decades. By contrast, accurate and objective measurement of physical activity is an area still under development. Fortunately, progress in this area is evident with several national surveillance efforts now using robust and objective measures of physical activity (4,24,25). As new data emerge from these studies, the relationship between physical activity and a range of health outcomes is being clarified. For example, data from the European Youth Heart Study found that physical activity and fitness are separately, and independently associated with metabolic health. Adiposity mediates the association between fitness and metabolic health risk but not that observed between physical activity and metabolic risk, suggesting that fitness and physical activity affect metabolic risk through different pathways (12). Advances in the objective measurement of physical activity (e.g., pedometers, accelerometers) will improve understanding of how physical activity relates to fitness and health outcomes in both adult and pediatric populations (14).

The emerging evidence that childhood physical activity *and* fitness both relate to childhood health emphasizes the importance of early identification of youth with low levels of fitness, the promotion of fitness-oriented exercise at a young age, and supports previous work proposing the inclusion of fitness assessment in standard health monitoring systems (20). A recent review in this area concluded that “Schools may play an important role by identifying children with low physical fitness and by promoting positive health behaviors such as encouraging children to be active. . .” (20; pp. 1).

While academics and physical educators have been debating the pros and cons of fitness testing in children within schools, and the impact of physical activity vs. fitness; children worldwide have become more inactive and more overweight (23). This has created a unique opportunity, even an obligation, for researchers to refine current measurement practices; to even use measurement as a form of intervention. We live in an evidence-based society where policy is not changed without data; hence, government officials and policy makers have been demanding evidence to guide the creation of new policies and programs for children. Perhaps it is time we address the issue of measurement in physical education from a more multidisciplinary perspective.

An Alternate Assessment Model (The Zebra)

Many have argued that fitness testing should be abandoned in schools—that we should “get off the horse” (10,18,22). The purpose of this article is to continue the academic debate about the fitness testing of children and argue that *it is indeed time to dismount the horse—because we should have been riding a Zebra all along*. Zebras have stripes; many stripes of different shape and size, the stripes are vertical on the body and neck but horizontal on the legs, and no two zebras have identical stripes. We use the analogy of the zebra to illustrate that physical fitness (or the Horse) is only one part (but an important part) of what physical education, grass-roots sport programs and active living initiatives should aim to achieve. We believe it is physical literacy, a multidimensional and interactive construct (the Zebra), that we should be concerned about, and should measure. We define physical literacy as a construct which captures the essence of what a quality physical education or a quality community sport / activity program aims to achieve. It is the *foundation* of characteristics, attributes, behaviors, awareness, knowledge, and understanding related to healthy active living and the promotion of physical recreation opportunities, and positive health choices across the lifespan. We propose that physical literacy has four reciprocally interacting core domains, (a) physical fitness (cardio-respiratory, musculoskeletal), (b) motor behavior (fundamental motor skill proficiency), (c) physical activity behaviors (objectively measured daily activity), and (d) psycho-social/cognitive factors (awareness, knowledge and understanding; Figure 1). A truly physically literate child would develop competence in each of these 4 core domains and be able to apply these skills in multiple contexts such as land, water, ice, and air.

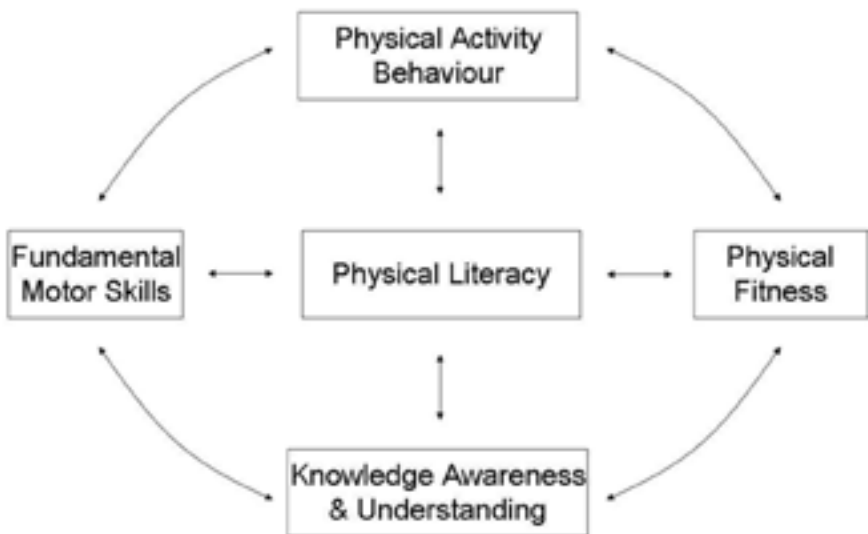


Figure 1 — Domains of physical literacy.

It is our position that the historical practice of fixating exclusively on physical fitness testing in children is flawed because fitness is only one piece of a multifaceted puzzle—physical literacy. Most believe that fitness is important in children, at least on some level, otherwise why would we have been testing it for the past 50 years (19)? We believe that most experts would also agree that fundamental motor skills, attitudes, knowledge and beliefs, and physical activity behaviors are also important to the overall physical development, health and wellness of children. This type of model is more in line with traditional physical education curricula around the world and is supported by the American Academy of Pediatrics who emphasize that physical education should “help students to develop knowledge, attitudes, motor skills, behavioural skills and confidence needed to adopt and maintain physically active lifestyles” (pp.1156; 2). Most would also agree that physical education does not teach just fitness; fundamental motor skills, physical activity behaviors, and knowledge components contribute to a well-rounded physical education curricula (13). Therefore, *we propose that we should not stop testing fitness in children, but we should not be assessing fitness in isolation.*

There is mounting evidence to support this new approach because it is becoming clear that fundamental motor skills, physical fitness, physical activity and knowledge are related to each other. Emerging literature has demonstrated that fundamental motor skills are related to physical activity (28), physical activity is related to physical fitness (21), and motor skills are related to physical fitness (5). Knowledge is a critical component of skilled motor performance (27), physical activity participation (15), and physical fitness (29). The question is: Why have we been measuring fitness in isolation when the literature indicates a complex interaction of multiple factors, and although critically important, *physical education is not just about fitness.* In fact, the four national standards for physical education in the United States identified by the National Association for Sport and Physical Education are: motor skill competency, knowledge, physical activity and physical fitness (13). These are the same domains we propose should be assessed and they are consistent with the Canadian physical education curricula from each province. Why have we been measuring the “Horse” when the “Zebra” is more closely linked to North American curriculum?

Research papers on assessment practices in physical education are scarce in the scientific literature; however, Burgeson and colleagues (8) recently surveyed school health policies across the United States. They found that physical education is mandated in a minimum of 74.8% of the states, and among schools required to provide physical education, 74.4% give students a numerical or letter grade. How teachers arrive at these letter grades is not clear because skill performance assessments are only mandated in elementary and middle schools in 4% of the states, and only 6% of the states mandate it in high school. Written testing in physical education are required by 7.8% of the states at the elementary and middle school level, and only 9.8% of the states mandate written testing at the high school level. Fitness testing is required by 13.7% of the states at the elementary level, 15.7% of the states at the middle school level, and 18% of the states require fitness testing at the high school level. Burgeson and colleagues (8) also found that when asked how they assessed student performance in physical education, teachers in 95.7% of the schools used *participation* as a criterion in at least one required course, in 93.5% of schools they used *attitude*, 71.9% of the schools used *appropriate clothing*, in

67% of the schools they used *attendance* (8). What this indicates is that there is a disconnect between what is in the physical and health curricula, and what is assessed by the teachers to provide a grade on the students' report cards. This highlights the need for a more robust and comprehensive assessment of *physical literacy*.

Conclusion

It has been suggested that fitness testing in the school setting be stopped, that "the horse is dead; let's dismount" (22). We argue that the horse is indeed dead, but "we should be riding a different animal – the Zebra." The fear of assessment should not out-weigh the potential benefit of the information received and the pedagogical value of robust assessment as internalized by the students. Fitness, physical activity behavior, motor skills and knowledge are all important components of the physical education curricula and are potentially powerful indicators of child health. The health of today's children is at serious risk from the complications of obesity and inactivity provoked by modern lifestyles. We believe the robust assessment in this area is as important as numeracy and literacy.

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