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Are today's children fit and active?

Twenty two years ago, Armstrong (1989) reported that "Children are fit, but not active!" He described the physical activity (PA) level of over 300 British youths aged 11 to 15 years old, as measured by heart rate monitors. Armstrong reported that 50% of the girls and more than 25% of the boys did not perform any 10 minutes bout of PA at a heart rate ≥ 139 beats per minute (bpm). In addition, physical fitness (PF) was assessed with a treadmill VO_2max test. The participants were as fit as the first children that were tested in laboratory settings 50 years before.

The primary purpose of the current article is to determine if such a statement would still be tenable in 2011. Secondly, recommendations pertaining to the role of schools in promoting PA and increasing PF among the paediatric population are formulated.

Physical activity

Since the publication of Armstrong's article, PA guidelines have changed markedly. Earlier guidelines stipulated that children should engage in vigorous PA for periods of 20 minutes or more at least 3 times per week at an intensity corresponding to a heart rate ≥ 139 bpm (Simons-Morton et al., 1988). Nowadays, it is generally recommended that children engage in at least 60 minutes of daily moderate to vigorous physical activity (MVPA) (Tremblay et al., 2011; Strong et al., 2005). Because PA questionnaires generally have limited validity and reliability, objective measurements (i.e. pedometers and accelerometers) are increasingly used (Welk et al., 2000). A systematic review of studies which compared subjective and objective assessments has shown that children's PA levels appear consistently higher when subjective measures are used (Adamo et al., 2009).

Studies using objective measures of PA generally reveal very low compliance to PA guidelines. For example, according to the National Health and Nutrition Evaluation Survey, less than 8% of US adolescents met the PA guidelines (Troiano et al., 2008). The Canadian Health Measures Survey has shown that only 7% of children and youth are sufficiently active (Colley et al., 2011). Even self-reported data from the 34 countries who participated to the Health Behavior in School-age Children study (N = 137593 children aged 10-16) showed that more than half of the participants were insufficiently active in all of these countries (Janssen et al., 2005).

In contrast, Canadian children spend an average of 8.6 hours of daily sedentary time (Colley et al., 2011). Similarly, a recent American report indicated that children spend more than 40 hours per week in sedentary pursuits (Rideout et al., 2010). These figures are not trivial since sedentary behaviours are increasingly recognized as an independent cardiovascular disease risk factor (Tremblay et al., 2010).

Physical fitness

There is increasing evidence suggesting that children's and adolescents' fitness levels have decreased significantly during the last decades. Tomkinson and colleagues (2003) explored the secular trends in the performance of children and adolescents on the 20 meters shuttle run test between 1980 and 2000. Their meta-analysis included 55 studies from 11 different countries (N = 129

882). Overall, the sample-weighted mean performance decreased by 0.43% per year. Their findings are coherent with studies from Canada (Tremblay et al., 2010), Denmark (Wedderkopp et al., 2004) and Sweden (Westerstehl et al., 2003) which all indicated major reductions in most aspects of PF.

Further, the definition of PF has evolved from a performance-oriented focus towards a health-related focus which now includes elements such as body mass index, waist circumference, and various metabolic biomarkers (Bouchard & Shephard, 1994). The prevalence of overweight and obesity in the paediatric population is increasing at an alarming rate throughout the world (Wang and Lobstein, 2006). The prevalence of cardiovascular disease risk factors such as elevated blood pressure and cholesterol level and reduced insulin sensitivity is also increasing markedly (McCrindle et al., 2010).

Association between physical activity and physical fitness

One of the major issues identified in Armstrong's (1989) article was the lack of a significant relationship between PA and PF. Similarly, Malina and colleagues (2004) reported that several studies have found weak correlations between these variables. Potential reasons for this counter-intuitive finding include:

1) Limitations in the reliability and validity of methods used to assess PA (Welk et al., 2000)

2) The strong influence of genetic factors on an individual's PF and his/her response to exercise training (Bouchard et al., 1998, 1999)

3) The low stability of PA during childhood and adolescence (Malina et al., 2004)

However, there is evidence suggesting that increasing PA can enhance PF. Indeed, several studies in which children have been assigned to short-term training programs have shown increases in cardiovascular fitness (Strong et al., 2005).

What can schools do to address these issues?

Current evidence clearly suggests that today's children are both inactive and increasingly unfit. Increasing PA and PF at the population level will likely require interventions at multiple levels of influence such as the individual, the social environment, the schools, the physical environment and government policies (Sallis et al., 2006). The school setting clearly represents an important setting for health promotion interventions (Pate et al., 2006) because, in many jurisdictions, it is mandatory for individuals to go to school until 16 years of age. Further, previous research has shown that when opportunities to be active during school time are restricted, children typically do not compensate by increasing their PA level (Dale et al, 2000). Interestingly, increasing physical activity opportunities can also favour academic achievement (Trudeau & Shephard, 2008). Schools can promote a healthy and active lifestyle through different ways, including:

1) Physical education: Several studies have shown that quality specialist-taught physical education can enhance PA levels and PF, especially when sufficient curricular time is dedicated to this discipline (Pate et al., 2006).

2) Active transportation: Children who walk or cycle to and from school are more active than their peers who are driven in cars or buses (Faulkner et al., 2009). This additional PA could contribute to improve PF.

3) Break times: Time allocated for breaks has decreased during the last decades; thereby shrinking opportunities were children can engage in unstructured play (Waite-Stupiansky & Findlay, 2001) which likely involves PA.

4) Intramural and extracurricular sports: Increasing non-curricular school-based PA opportunities can be an effective way to increase PA levels, reduce sedentary

behaviors and prevent obesity (Simon et al., 2008). Such a strategy could reach individuals that do no participate in competitive sport (Pate et al., 2006).

5) Health education: The Planet Health intervention has shown that health education can reduce sedentary behaviour and the prevalence of obesity (Gortmaker et al., 1999). Importantly, health education should not be taught solely by physical educators to avoid reducing PA during physical education classes.

In conclusion, current evidence clearly suggests that today's children are physically inactive and increasingly unfit. As part of a multi-level approach to health promotion, schools can play a leadership role by ensuring that children get the appropriate amount of daily MVPA.

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