The Need to Increase Physical Activity During the Elementary and Middle School Years

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Despite evidence linking physical activity during childhood to later health outcomes, physical education programs in elementary and middle schools have slowly been eroded during the past two decades. Many educators and parents believe that the time and money spent on physical activity during school hours might be better spent on academic pursuits. This Brief provides a summary of three relevant longitudinal studies, and a recent study by Tremblay, Inman, and Willms (in press) which examined the relationships among children’s self-esteem, levels of physical activity, body-mass index, and academic achievement. The data were collected from the full population of grade 6 students in New Brunswick in 1996, as part of the Elementary School Climate Study. The findings indicate that the concern that physical activity has a deleterious effect on achievement is not well founded. Moreover, increased physical activity has important positive effects on self-esteem and physical health, which in the longer term may contribute to academic success.

The leading cause of death in Canada is heart disease. Three of the most important modifiable risk factors for heart disease are poor nutrition, smoking, and a lack of physical activity. The evidence linking physical activity and health is stronger for adults than for children; however, the likelihood of being active as an adult is influenced by habits established during childhood.

Despite evidence that quality physical education programs can have a positive impact on children’s health and emotional development, the number of qualified physical education specialists in New Brunswick elementary and middle schools decreased by 60 percent between 1991 and 1995.

The results of a survey covering a large, representative sample of grade 6 students in New Brunswick are consistent with findings derived from smaller, well-controlled intervention studies: increased time spent on physical activity has a negligible relationship with academic achievement.

Our research found a strong relationship between increased physical activity and self-esteem. Self-esteem declines for many children during adolescence. These results suggest that participation in physical activities is likely to help many students maintain a positive self-esteem during that difficult period.

The findings also indicate that children with excessively high body mass index (BMI), an important indicator of future health status, tend to be less physically active and have lower self-esteem. Children from disadvantaged families were more likely to have excessively high BMIs, but this was not the case for those who participated regularly in physical activities.
Overview

Physical activity can influence a range of schooling outcomes such as self-esteem and academic achievement. Yet, in spite of the evidence that quality physical education programs can have a positive impact on children's development, physical education programs in schools have slowly been eroded during the past two decades. For example, in an effort to cope with funding cuts, the New Brunswick Department of Education reduced its physical education (P.E.) specialist positions in elementary anglophone schools by 60% between 1991 and 1995 (See Figure 1; Tremblay, Pella, & Taylor, 1996).

Some Education Departments maintain that the time and resources spent on physical activity might be better spent on academic pursuits. Many parents also favour reducing physical education or eliminating it altogether, because they believe that spending time during school hours on physical activity inhibits their children’s chances of academic success.

Yet few would dispute the fact that participation in regular physical activity improves health. It strengthens cardiovascular function; reduces the risk of developing type II diabetes, hypertension, and hyperlipidemia (high fat levels in the blood, such as cholesterol); and positively influences choices pertaining to nutrition and lifestyle, including the decision not to smoke.

The evidence linking physical activity and health is stronger for adults than for children; however, the likelihood of being active as an adult is influenced by habits established during childhood. Moreover, an active lifestyle during childhood may also reduce the onset of cardiovascular disease. For example, fibrous plaque lesions develop during early childhood, and the extent of fatty “plaque” build-up on the inner lining of arteries (atherosclerotic development) is related to blood pressure and body mass index. (Body mass index or BMI is the ratio of a person’s weight in kilograms to his or her height in meters squared). The research indicates that these risk factors for cardiovascular disease, including obesity, hypertension, and elevated blood cholesterol levels, also develop during childhood, and are attenuated by increased physical activity.

Figure 1. Full Time Equivalent P.E. Specialists in New Brunswick Anglophone Elementary Schools, 1990 - 1995

Background

Shephard (1997) discussed the findings of research on the relationship between physical activity and academic performance. Generally the research reveals a positive or weak relationship between participation in athletic programs and academic success, as gauged by grade point averages, report card results, and IQ scores. Three longitudinal studies, which were conducted in France, Australia, and Canada, are especially relevant.

The French research, conducted in a suburb of Paris in the 1950’s, is widely cited because it entailed a dramatic intervention: students in the experimental school participated every afternoon in a wide range of physical activities. They also received vitamin supplements and their siesta periods were increased. Even though the school day was lengthened to accommodate some of the additional time spent on physical activity and siestas, time devoted to academic instruction was reduced by 26%.

The study found that children in the experimental school were equally likely to receive a “certificate of study” as control students attending schools elsewhere. Teachers in the experimental school reported that their students appeared more calm and attentive during academic instruction, presented fewer disciplinary problems, and had better attendance. Although the study lacked the scientific rigour of a controlled experiment by today’s standards, it suggests that enhanced physical activity at the expense of instructional time does not necessarily lead to poorer academic performance.

Research conducted in Australia also supports the notion that increased curricular time spent on physical education, particularly fitness oriented activity, facilitates academic progress despite a reduction in instruction time. In the School Health, Academic Performance and Exercise (SHAPE) study, Dwyer and colleagues (1979) examined the effects of increased physical education on the academic development of children in grade 5. They studied three groups: control (3x30 minute classes of P.E. per week), fitness (75 minutes of P.E. per day with a focus on cardiovascular fitness), and skill (75 minutes of P.E. per day with a focus on skill development).

In spite of a significant curtailment of scheduled academic learning time, there were no significant differences between groups on gains in arithmetic or reading skills. Indeed, there were significantly larger improvements in classroom behaviour scores in the P.E. enhanced groups, and a trend towards improved arithmetic scores in the fitness group compared with the others. Follow-up research by the investigators suggested that the students exposed to the P.E. intervention developed an advantage over the control students for arithmetic and reading scores two years after the intervention, while maintaining better classroom behaviour.

The Trois Rivières study conducted by Shephard and his colleagues (1984) had 546 primary school students representing the experimental group while children in the immediately preceding and succeeding classes acted as controls. The experimental group had one extra hour per day of physical activity provided by a specialist and a 14% reduction in academic time, yet all children were exposed to a similar overall academic environment. The results of the six-year longitudinal study demonstrated that although the control groups had better initial academic grades, the experimental group outperformed the controls significantly in grades 2, 3, 5, and 6. A conclusion drawn by the authors was that classroom assessment was improved rather than worsened when some school time was spent in required programs of physical activity.
Physical Activity, Self-Esteem, BMI, and Academic Achievement

The development of self-esteem is a primary goal in most elementary schools, because it is considered to be a factor underlying motivation, persistence, and academic success. Most children want to be seen as competent in physical activity, especially within their own peer group. Thus, success in the physical domain may have a direct causal effect on self-esteem, and therefore an indirect effect on academic achievement. Physical activity may also affect self-esteem through its role in preventing obesity and contributing to children's general sense of well-being. The relationship between physical activity and self-esteem has not been well established for the population of school-aged children. Also, the research has not indicated whether BMI has a mediating role in these relationships.

Our study of the relationship between physical activity, self-esteem, BMI, and academic performance (Tremblay, Inman, & Willms, in press) employed data from the New Brunswick Elementary School Climate Study. In the spring of 1996, a questionnaire was administered to the full population of grade 6 students in the province. The questionnaire asked students a number of questions pertaining to the academic and disciplinary climate of their classroom and school, their family background, their participation in physical activities, and several affective measures, including self-esteem. The questionnaire data were merged with students' test scores in reading, mathematics, science, and writing, which were based on standardized tests administered by the New Brunswick Department of Education. The achieved sample with complete data comprised 5,146 students.

The outcome measures used in the study included students' mathematics and reading scores, their BMI, and a measure of self-esteem based on 16 items from the Self Description Questionnaire (Marsh, & O'Neill, 1984). The measure of physical activity was based on four questions regarding students' regular participation in physical activities, both at school and outside of school. Three important findings emerged from the study.

### Physical activity and self-esteem

We observed a significant positive relationship between self-esteem and levels of physical activity for both boys and girls (see Figure 2). This relationship was large in substantive terms, even after controlling for family socioeconomic status. Because previous research has shown that self-esteem is related to academic achievement and health outcomes, our findings support an increase in physical activity pursuits as a means of improving achievement and health.

A number of studies have shown that self-esteem tends to be lower for girls than for boys during early adolescence. This was also apparent in our sample of grade 6 children in New Brunswick. But we also found that girls had lower levels of physical activity than boys. Moreover, the difference between girls and boys in their self-esteem diminished considerably when levels of physical activity were taken into account. This suggests that females who are physically active may be less likely to experience low levels of self-esteem.

### Physical activity and achievement

We found that increased levels of physical activity had a weak, negative relationship with academic achievement in both mathematics and reading, after account was taken of family socioeconomic status. However, the size of the effects was trivial: the negative effect associated with a dramatic increase in physical activity amounted to about one to two weeks of additional academic instruction.

### Increased activity and BMI

We found that increased levels of physical activity were associated with a lower BMI. This relationship held even after taking account of family socioeconomic status. We were also concerned with the number of children who had excessively high BMIs, and we found that a moderate increase in activity was associated with about a 10 percent reduction in the likelihood of a child having an excessively high BMI.

Previous research on adults has established that those with lower socioeconomic status tend to have higher BMIs. Our study shows that this relationship is already established before children finish elementary school. We were also intrigued to find that levels of physical activity had a mediating effect on this relationship: that is, students with low levels of family socioeconomic status were less likely to have excessively high BMIs if they participated regularly in physical activities.

This finding also showed that students with higher self-esteem, on average, had lower BMIs. It is not possible in this kind of study to discern whether low self-esteem leads to an excessively high BMI, or a high BMI results in diminished self-esteem. Nevertheless, increased physical activity was found to be associated with increased self-esteem and lower BMI, and therefore is likely an important means for improving both health and well-being.
Conclusion

Perhaps for the first time in our evolution, an entire generation of children have the opportunity, or misfortune, of living a sedentary lifestyle. The habitual activity level of our children may be insufficient to provide the health protection that was inherent in the lifestyle of previous generations. This is problematic, because the lack of activity could result in the accelerated onset of chronic disease and a premature loss of human resources and productivity.

The findings of our research, based on a large, representative sample of grade 6 students in New Brunswick, show that increased physical activity is related to higher self-esteem. The self-esteem of many children, particularly females, declines during adolescence. These results suggest that participation in physical activities may help children traverse this difficult period. Some children, especially those in lower socioeconomic families, have less access to recreational and sports facilities outside of school, and face other barriers to participation. Taken together, these findings provide a strong case for the provision of physical education and training in the public schooling system.

The optimal amount of curriculum time to devote to physical education remains an elusive question. Our findings show that increased activity is related to improved self-esteem, which in turn is related to improved academic achievement; however, increased physical activity seems to have a trivial relationship with academic achievement.

The relatively small effects on academic achievement is consistent with the findings of previous cross-sectional and longitudinal studies. In a large-scale multi-purpose survey, such as the NB Elementary School Climate Study, only rudimentary measurements of physical activity can be obtained. We require longitudinal intervention studies, with accurate measures of the quantity and quality of physical activity, to discern the appropriate levels of physical activity for children at various ages. Such research could provide detailed insight into the relationships among physical activity, participation in sports, physical education time, and academic performance.

The erosion of physical education programs in schools is disturbing since the school is the only location where physical educators can reach all children, and where all children can be assured of an opportunity for physical education experiences. Without a proper school program, far too many children do not have the means to learn and develop the activity-related skills which are fundamental to their well-being. Canadian children run the risk of being inadequately prepared to cope responsibly with their ensuing lifestyle challenges. Moreover, the evidence suggests that childhood physical activity and physical fitness levels persist into adulthood, which means that the erosion of physical education programs may become an even greater public health concern over the longer term.

References


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