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Raising activity levels as a health risk reduction intervention in Hong Kong children

Key Messages

1. Physical activity behaviours are known to be beneficial in reducing health risk. However, behavioural change in young people in the Hong Kong school population has been difficult to achieve.
2. Schools remain one of the most appropriate institutions in which to introduce wide-scale changes in health behaviour. Because teachers are often required to become involved in school research, care should be taken to assess the ability and willingness of consenting teachers and to provide them with adequate support in order to carry out the intervention.

Introduction

There is a large body of research that underscores the importance of physical activity in a wide range of psychological and physical processes that influence health and well-being. Of particular interest to health professionals is the compelling evidence of the role of physical activity in the primary prevention of cardiovascular disease and, in particular, coronary heart disease. In addition, regular physical activity has been linked to the reduction of risk in morbidity and mortality resulting from chronic ailments such as non-insulin diabetes mellitus, hypertension, osteoporosis, and certain types of cancer. Although the amount of physical activity that benefits health is not known, there are suggestions that with every increase comes an added benefit. However, this does not mean that activity of vigorous intensity is necessary to improve health. What seems to be required is habitual moderate-to-vigorous physical activity that can be sustained throughout the life cycle. According to US researchers, an intervention that focuses on increasing the activity of young people is urgently needed.[1]

In Hong Kong, the habitual physical activity patterns of school age children are similar to those found in industrialised countries in the West. Macfarlane[2] found less than 4% of Hong Kong primary-aged children maintained a single 20-minute period of low-to-medium physical activity per day. Wong and Macfarlane[3] found that during each 35-minute class in physical education (PE) in Hong Kong schools, only 3.4 (10%) minutes of student time is devoted to vigorous activity. Moderate-to-vigorous physical activity levels are seldom attained by Hong Kong pupils. Moreover, existing instruction in PE fails to provide adequate systematic learning about the body and the benefits of regular exercise. Nevertheless, school PE programmes in general have been identified as the site most likely to provide opportunities to investigate the potential scope and possible impact of modified PE.

Aims and objectives

The purpose of this study was to implement and evaluate the efficacy of an intervention to increase students' habitual physical activity.

Methods

This study was conducted from August 1998 to February 2000.

The intervention

Twenty Hong Kong secondary schools that obtained informed consent from the parents of enrolled students were invited to participate. Ten schools employing in-service PE teachers registered in a university curriculum design and planning course in PE were recruited for the experimental group. These teachers, as part of their term assignment, were asked to examine and modify the PE curriculum at their school to enhance the opportunities for students to improve their fitness levels. The invitation to in-service teachers to modify their PE curriculum was an attempt to allow them to actively participate in the design and implementation of the intervention and to reduce the effect of a 'top-down' approach.

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The design focused on three aspects. First, learning experiences that were likely to improve fitness by raising the intensity level of physical activity during sport skills training were included. Second, to increase activity at home teachers provided students with information and encouragement in selecting activities that they could perform with their parents and siblings. Third, a portfolio was designed to motivate the participants to practise a healthy lifestyle and to provide a record of their involvement in the programme was distributed to students after the pre-test.

Design

Two PE classes involving Form 1 and 2 boys and girls (age, 11-13 years) were selected in each of the experimental and control schools. A pre-test involving several behavioural measures was conducted at the beginning of the project. A post-test was conducted at the end of the 4-month intervention period. Five students were randomly selected from each PE class for the experimental and control groups. A modified Academic Learning Time in Physical Education (ALT-PE) instrument was used to directly observe student and teacher behaviour during the PE class. In addition, the five participants wore a heart rate monitor (Polar Electro PE4000) and a three-dimensional accelerometer (Tritrac R3D) to measure their levels of physical activity over 8 continuous hours. Data acquisition began once the student arrived at school and was performed over one school day that included a 1-hour PE class, and one day that did not. The Tritrac data were reported as the mean 'Vector Magnitude' score (in counts·min^{-1}), whilst the heart rates were reported as the time each student spent in mild exercise (heart rates above 139 beats·min^{-1}), and in moderate-to-vigorous exercise (heart rates above 159 beats·min^{-1}). A Youth Risk Surveillance Survey questionnaire was administered during the pre-test and post-test to all study participants. A total of 1383 Form 1 and 2 students participated in the pre-test and 1231 in the post-test. Vigorous physical activity, moderate physical activity, stretching exercise, and strengthening exercises scores were analysed.

Results

Heart rate monitors and motion sensors

The results from the 3-D Tritrac motion sensor showed that the intervention had little effect on improving activity scores either on days involving a PE lesson or on those without a PE lesson. On days with a PE lesson both the control and experimental groups produced similar average vector magnitude scores around 290-300 counts·min^{-1}, whilst the non-PE days produced scores around 210-220 counts·min^{-1}. The only positive intervention result was a small non-significant increase of 4.5% in the average vector magnitude scores after intervention in the experimental group, whilst the control group showed a small non-significant decrease of 5.0%.

The heart rate data also showed no improvement in either mild activity or moderate-to-vigorous activity. On days involving a PE lesson, both the control and experimental groups accumulated about 45 minutes of mild activity, and 18 minutes of moderate-to-vigorous activity. However, on non-PE lesson days, both groups halved their discretionary activity levels from about 20 minutes of mild exercise before the intervention, to around 10 minutes after the intervention. In addition, the time spent in moderate-to-vigorous activity also dropped from around 8 minutes preceding the intervention, to 3 minutes after the intervention, with no significant differences between the control and experimental groups. Even during the 60-minute PE lesson, no improvements in the experimental group were seen after intervention, with levels of accumulated mild exercise (18 minutes) or accumulated moderate-to-vigorous activity (7 minutes) remaining unchanged throughout the study.

The youth risk surveillance survey

Participation patterns for both groups in vigorous, moderate, stretching and strength exercises were not significantly different. While boys were more vigorously active than girls in both control and experimental groups, girls were more active than boys in the moderate-level, stretching and strengthening categories. Form 1 boys and girls in both the experimental groups and control groups were less active at the end of the study than at the beginning.

In general, the participation patterns provided no indication that the intervention had any effect, as there were no discernable changes in activity patterns in either the control or experimental groups during the intervention. The direct observations and survey data were in agreement with the heart rate and body motion data, this indicated that no significant improvements in activity patterns occurred over the intervention, and, if anything, discretionary activity decreased.

Teacher behaviours

Although these data indicate that the intervention to raise levels of activity was ineffectual, they do not explain why the intervention failed or what can be learned from the study that can be addressed in future studies. What was of benefit was a follow-up procedure that allowed the teachers to share their subjective experiences making it possible to understand why pedagogies recommended in the intended curriculum are often not used.

We found that a considerable gap exists between the assumptions of the researchers and the daily practical realities of PE teaching. Teachers are not simply passive recipients of change but make decisions, within the constraints of the institution, about what is possible and what is not. During their debriefing the teachers explained that they were required to establish a curriculum plan before the school year commenced that included information on scheduling units of PE, teaching assignments and

most important, the facility requirements for each activity. Once established, teachers rigidly adhered to it for the rest of the year and found the intervention to be obtrusive and upsetting because it did not fit into the curriculum that they had put into effect. Although the lesson plans to be used as an intervention were prepared by the teachers, they themselves were not willing to deviate from their own plan because it did not fit.

Discussion

While this study was unsuccessful in raising the activity rates of young people, it provided an excellent illustration of the difficulties of implementing change. Moreover, the study identified the importance of the role of the PE teacher and demonstrated that strategies are easier to design than to implement. In school-based interventions, the teacher becomes the last and most important link between statements of intention and classroom reality. To increase the intensity and volume of activity in school PE programmes requires much more consideration of the school setting and the engagement of teachers in a discourse to design practical strategies to change the emphasis and management of the PE class. Consideration must be given to the 'situational and personal–social factors' that prevent the transformation of untested ideas into effective strategies.[4] Large classes, resistance of other staff to change, no time for planning and little opportunity for reflection coupled with the lack of support, release time and assistance to sustain the pedagogical changes have already been widely observed among teachers.

In retrospect, what the study lacked was the foresight to invest in teacher development and to confront rather than ignore the situational forces that would constrain the transformation of ideas into action. This study has provided a clearer focus for future action research by suggesting that it is not enough for teachers to design and own the plan for change. Teachers must also be supported to a point where their beliefs and values can be allowed to transform into practice and where benefits for the teacher can be identified. Their inability to apply the effort and time that was needed to control the intervention was not due to indifference to the research but to the work environment and the consequences that influenced their good intentions. Researchers would do well to pay attention to what McLaughlin termed "local capacity and will" before attempting change.[5] Accurate assessment of the will and capacity of teachers to embrace the proposed changes is essential if the project is to be enacted. Too often, as in this case, what is planned as curriculum innovation and improvement may be far from the realities of everyday practices in schools.

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