ORIGINAL ARTICLE

Attitudes towards exercise and physical activity behaviours in Greek schoolchildren after a year long health education intervention

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Objective: To examine the short term effects of a health education programme on Greek primary schoolchildren

Methods: The school based intervention programme was applied to 29 children in the 6th grade of the 2nd Primary School of Agios Stefanos (~12 000 inhabitants); 49 pupils from the 1st Primary School constituted the control group. To assess the effectiveness of the intervention, attitude and behavioural variables were measured before and after the intervention.

Results: After adjustment for initial differences in the assessed variables, pupils who took part in the intervention had more positive attitudes towards physical activity than the control group and scored significantly more highly on their intention to participate in physical activity. Moreover, pupils in the intervention group reported more hours/week spent in organised physical activities than pupils in the control group (mean (SD) 3.54 (0.32) v 2.54 (0.26), $p < 0.020$). Finally, a higher proportion of pupils in the intervention classes matched the recommendations of 60 minutes of moderate to vigorous physical activity daily (77.4% v 55.1%, $p < 0.043$).

Conclusions: Within the limitations of the study, the data show that school health education programmes have the potential to slow the age related decline in physical activity and help pupils establish lifelong, healthy physical activity patterns. Promoting healthy habits and physical activity behaviours during childhood may prevent some of the leading causes of morbidity and mortality in the Greek population, and also decrease direct healthcare costs and improve quality of life.

Regular participation in physical activity during childhood can lay the foundation for numerous health benefits.^{1 2} However, studies have revealed that physical activity declines precipitously with age, and activity levels of children are not sufficient to promote optimal health.³ In the long run, physical inactivity increases the risk of many chronic diseases in adulthood, including coronary heart disease, colon cancer, and diabetes.^{4 5} In the short run, physical inactivity has contributed to an unprecedented epidemic of childhood obesity, which is currently plaguing most Western countries.⁶

Research evidence also indicates decreased physical activity levels in Greece and an alarmingly high prevalence of obesity among Greek children.^{7 8} Furthermore, it has been found that a significant percentage of 12 year olds exhibit more than three modifiable cardiovascular risk factors.⁹ In this context, school health education is considered to be one of the most promising solutions for health promotion. Comprehensive school based health programmes can achieve both short term and long term behavioural changes.¹⁰ Despite the above, and the positive results from some initiatives,^{11 12} health education is not introduced as a compulsory subject in Greek schools, but rather as an educational procedure, depending on teachers' enthusiasm to implement such interventions at classroom, school, or district levels.

To achieve substantial health benefits, children should participate in at least 60 minutes of moderate to vigorous physical activity on most days of the week.¹³ Thus physical education (PE) and health education programmes should promote extracurricular physical activity, as these recommendations cannot be met through PE alone.^{14 15} Accordingly, specific programmes to promote extracurricular activity must be developed and continuously evaluated. This paper reports the effects of a health education programme on

the attitudes and intentions of primary schoolchildren towards physical activity. According to planned behaviour theory,¹⁶ intention is the prime cognitive element predicting behaviour. Hence an improvement in attitudes and intentions towards physical activity was expected to lead to increments in physical activity levels.

METHODS

Subjects

The study was conducted in the town of Agios Stefanos (~12 000 citizens), Greece, with the approval of the Greek Ministry of Education and the consent of pupils and teachers. The two primary schools of the town were randomly assigned to an intervention or a control condition. The intervention group comprised 29 pupils (18 boys, 11 girls) in the 6th grade (ages 10–12.5 years) of the 2nd Primary School of the town. Similarly, 49 pupils (24 boys, 25 girls) of the same age in the 1st Primary School of the town received no health intervention and formed the control group. There was no difference in sex distribution by condition ($\chi^2_{(1)} = 1.25$, $p < 0.26$). All PE classes were coeducational. In accordance with the national curriculum guidelines, pupils participated in PE lessons twice a week for 45 minutes each lesson.

Intervention characteristics

The intervention programme lasted one academic year (2004–2005) and was teacher delivered. Thus, before the intervention, the PE instructor and the classroom teachers involved in the project participated in teacher orientation

Abbreviations: OMVPA, organised moderate to vigorous physical activity; PE, physical education; TMVPA, total moderate to vigorous physical activity

Figure 1 Response choices for attitude and intent scales.

seminars conducted by the local Office for School Health Education. The aim of the seminars was to familiarise the teachers with the objectives of the programme. The significance and benefits of incorporating health education into the curriculum were emphasised. In addition, preparatory teaching material was developed on the basis of successful, classroom tested health promotion programmes.^{17, 18} The PE instructor conducted both the physical activity and health components of the programme.

During the PE classes, cooperative activities were preferred over competitive activities. The games and activities chosen were enjoyable and fitness oriented. The design of the lessons allowed every student to choose a level of difficulty in skill learning and practising. Goal oriented activities were used, establishing a certain learning or improvement target. An individualised goal setting programme was also introduced to the pupils. At the beginning of the intervention, pupils were measured in four health indices: the multistage 20 m shuttle run test (cardiorespiratory fitness), the sit and reach test (flexibility), the sit up test (trunk strength/endurance), and the body mass index (body composition).¹⁹ Pupils kept these records in their personal PE notebooks and set personal goals for improvement. It was made clear to them that these records were considered personal data and would not be used for grading.

Part of each PE lesson was a three minute talk describing the relation between physical activity and health. PE lessons were complemented with classroom lectures once a week. Through these lessons, the PE teacher had the chance to further increase pupils' knowledge on physical activity concepts. Computer aided lessons were also provided to promote pupils' interaction and entertainment. To maximise classroom time, the classroom teachers were encouraged to integrate health education into several school subjects—for example, analysing exercise energy expenditure in maths lessons, using texts on nutrition in reading lessons, constructing exercise and food pyramids in handicraft lessons.

As the important role of the family in shaping children's attitudes and behaviours is generally recognised, parental involvement was encouraged through homework assign-

ments with family activities, by sending educational material home, providing physical activity and nutritional guidelines, and by asking parents to send healthy snacks to school. Finally, to promote extracurricular physical activity, information about community based sports programmes was disseminated, and parents were advised to encourage their offspring to incorporate physical activity into their daily lives (active transportation to and from school, unstructured physical activity, etc).

The control group did not have any health education intervention. The PE teacher was asked to continue with the formal PE programme during the study. Both groups were measured at the beginning (October) and end (June) of the academic year.

Measures

Anthropometry

Age (accurate to 1 month) was recorded. Standing height was measured without shoes to the nearest 0.5 cm with a commercial stadiometer; the shoulders were kept in a relaxed position and the arms were allowed to hang freely. Weight was measured with digital scales (Seca) to the nearest 0.5 kg with subjects lightly dressed and barefooted.

Attitudes

The planned behaviour theory questionnaire,¹⁶ translated into Greek by Theodorakis,²⁰ was used. Pupils indicated their attitudes towards physical activity and sports participation over the upcoming 12 months on four scales (good-bad, healthy-unhealthy, pleasant-unpleasant, useful-not useful). The response format for each adjective pair included seven choices. For example, the response choices for the adjective pair good-bad ranged from very good = 7 to very bad = 1 (fig 1A).

Intentions

Intent was assessed by responses to the following statements: "I intend to participate in physical activity three times a week outside of gym class during the next 12 months" and "I plan to ... during the next 12 months". Figure 1B shows the response format. Similar measures of intention have been used in previous studies in the Greek physical activity context showing sound psychometric properties.²⁰

Physical activity

The physical activity recall questionnaire of Aaron *et al*²¹ was used. Children were asked to recall all moderate to vigorous physical activity, such as organised sports and other leisure time activities, in which they participated at least 10 times during the preceding year. For all activities, pupils had to give detailed information about frequency and duration of participation and total time spent on them. The school PE

Table 1 Basic characteristics of the subjects in the intervention and control groups

Variable	Intervention (n = 29)	Control (n = 49)
Age (years)	11.2 (0.4)	11.2 (0.3)
Height (cm)	150.3 (6.4)	147.8 (7.3)
Weight (kg)	45.2 (10.7)	45.2 (10.0)

Values are mean (SD).

Table 2 Correlation among measures before and after the intervention

Measure	1	2	3
1. Attitudes towards exercise			
2. Intention towards exercise	0.33**		
3. OMVPA (hours/week)	0.27*	0.31**	
4. TMVPA (hours/week)	0.29*	0.32**	
	0.24*	0.30**	0.78**
	0.26*	0.38**	0.80**

Correlation coefficients before (first row) and after (second row) the intervention. All correlation coefficients were significant at $p < 0.05$ (*) and $p < 0.01$ (**).

OMVPA, Organised moderate to vigorous physical activity; TMVPA, total moderate to vigorous physical activity.

teacher and the parents confirmed participation. The time (hours/week) devoted to activities such as walking, cycling, rhythmic gymnastics, dancing, basketball, soccer, athletics, swimming, running, skipping, and general participation in active outdoor games was considered total moderate to vigorous physical activity (TMVPA). Organised moderate to vigorous physical activity (OMVPA) is part of TMVPA and comprises only leisure activities out of school, performed under the supervision of a trainer on a regular weekly basis, probably in a sports club. The questionnaire's reproducibility coefficient in Greek pupils of the same age has been reported as 0.92.²²

Statistical analysis

The internal consistency of the instruments measuring attitudes and intent towards exercise was calculated using Cronbach's α statistic. Correlations between attitudes, intent, and physical activity variables were determined and expressed as Pearson's correlation coefficients. Mean (SD) was calculated for the characteristics of participants, intent and attitudes towards physical activity, and time spent in physical activity (hours/week). Intervention effects were examined through covariance analysis, in order to control for possible initial differences in the first measurement. In each analysis, the score of the first measurement was used as the covariate, and the score of the second measurement was used as the dependent variable. The χ^2 test and the McNemar test were used to examine between, as well as within, group changes in the percentages of pupils matching the physical activity recommendation of >60 minutes a day.

RESULTS

Table 1 shows basic characteristics of the subjects. There were no significant differences in age or anthropometric indices between the intervention and control groups.

Reliability analyses and relations among measures

For the first and second measurement, $\alpha = 0.92$ and 0.62 for the scale assessing attitudes towards physical activity, and 0.88 and 0.79 for the scale assessing intent towards physical activity respectively. Adopting an α of 0.60 as an acceptable criterion for the internal consistency of a scale, the two scales can be considered reliable. There was a positive association among examined variables both before and after the intervention (table 2). These findings support the construct validity of the measures used in this study.

Intervention effects

Table 3 depicts between group differences (results of analysis of covariance) in the studied variables, after adjustment for differences in the first measure. For attitudes toward

participation in physical activity, the results revealed that, after adjustment for differences in the first measurement ($F_{1,74} = 6.0$, $p < 0.017$), there were significant differences between the two groups ($F_{1,74} = 3.9$, $p < 0.05$, $\eta^2 = 0.05$). The adjusted means of the second measurement revealed that pupils participating in the intervention group, compared with the pupils involved in control classes, had more positive attitudes toward participating in physical activity.

As for the intent towards participating in physical activity, the results revealed that, after adjustment for differences in the first measurement ($F_{1,72} = 19.35$, $p < 0.001$), there were significant differences between the two groups ($F_{1,72} = 5.1$, $p < 0.027$, $\eta^2 = 0.07$). The adjusted means of the second measurement imply that pupils in the intervention group scored significantly more highly on intent towards participating in physical activity.

As far as physical activity is concerned, significant differences were observed in OMVPA between the two groups ($F_{1,77} = 5.66$, $p < 0.020$, $\eta^2 = 0.07$), after adjustment for differences before the intervention ($F_{1,77} = 42.6$, $p < 0.001$). Pupils in the intervention group reported more times per week spent in organised physical activities than pupils in the control group. Differences between pupils in the intervention and control groups with regard to total time spent in moderate to vigorous physical activity did not reach significance ($F_{1,74} = 3.52$, $p < 0.064$).

Figure 2 illustrates the percentages of pupils in the intervention and control groups who fulfilled the physical activity recommendation for health before and after the health education programme. The χ^2 test revealed that 32.3% of the intervention group and 26.5% of the control group ($p < 0.581$) matched the set criterion in the first measurement, with the corresponding values for the second measurement being 77.4% and 55.1% ($\chi^2_{(1)} = 4.09$, $p < 0.043$) respectively. The McNemar test revealed significant within group differences in both groups between the first and second measurement ($p < 0.0001$ and $p < 0.004$ for the intervention and control group respectively).

DISCUSSION

In view of the sedentary lifestyles and unhealthy habits of contemporary Greeks,^{12, 23} the school environment could offer a setting for effective countermeasures, through comprehensive health education programmes. In this study we report the short term effects of a health education intervention on attitudinal and behavioural measures of Greek primary schoolchildren. Our results indicate that the major goals of this intervention were achieved. The positive effects of the intervention on attitudes and intents, as well as the better physical activity values in the intervention group found at the second assessment imply that the intervention programme did influence children's behaviour in relation to health issues.

In accordance with previous studies, teaching pupils about the health benefits of physical activity had positive effects on

Table 3 Adjusted means of the second measurement after covariance analysis, with initial differences controlled for

Variable	Intervention group		Control group	
	M	SE	M	SE
Attitudes towards physical activity	6.65*	0.09	6.42*	0.07
Intentions towards physical activity	6.29*	0.11	5.95*	0.09
Physical activity variables				
OMVPA (h/week)	3.54*	0.32	2.54*	0.26
TMVPA (h/week)	7.50	0.51	6.26	0.40

* $p < 0.05$; see also table 2.

M, Estimated marginal means; SE, standard error; OMVPA, organised moderate to vigorous physical activity; TMVPA, total moderate to vigorous physical activity.

Figure 2 Percentage of pupils matching the physical activity recommendation of 60 minutes a day before and after the intervention.

their attitudes towards physical activity.^{24–26} The higher scores of the intervention classes on attitudinal measures, compared with the typical classes, can be attributed to the health related lectures and frequent health related reminders included in the teaching material. For example, when students were doing sit ups, the teacher could remark “our abdominals help in good posture”; when they were running, the teacher could remark that “now we are improving aerobic endurance”. There were reminders for the PE teacher to give as many such messages as possible. This has been suggested to be beneficial in attitude change.²⁷

A second factor that possibly contributed to the observed changes in attitudinal measures may be the limited number of competitive activities in the intervention programme. Competitive activities do not allow equal learning opportunities for every student²⁸ and may not contribute to the learning process. On the other hand, allowing children to participate in physical activities in which they feel competent makes it more likely that they will engage in them.²⁹ Thus the focus of the present study was on children’s enjoyment and willingness to participate in the PE classes. For this reason, emphasis was placed on total class participation in enjoyable, non-competitive exercise forms. Physical activities matched to the child’s ability are more likely to produce a feeling of success than those that are at too high a skill level. This should be taken into account in the design of future interventions aimed at increasing physical activity in children.

One of the goals of the programme was to promote physical activity outside of school. The significantly greater increase in time devoted to OMVPA and the higher proportion of pupils in the intervention classes who reached the recommendations of 60 minutes of moderate to vigorous physical activity daily indicate that this goal was achieved. A similar tendency was observed in the TMVPA, but without reaching significance, probably because of the large variation in the time spent in non-organised and irregular activities (data not shown).

This finding can probably be attributed to out of school encouragement and the information offered to the intervention classes on the appropriate time/intensity of physical activity for health benefits, combined with parental encouragement to support their children in increasing their extracurricular physical activity. Hence the significant increase in OMVPA in the intervention classes may reflect changes in parental attitudes towards increased physical activity. There is ample evidence that parental involvement in health education interventions is associated with significant gains in behavioural indices,^{30–31} whereas school based programmes with limited or no parental participation have failed to reach such significant gains.^{32–33}

Regarding changes in physical activity, the present results are generally consistent with earlier studies on school aged children in Greece³⁴ and elsewhere.^{35–36} On the other hand, other intervention programmes reported difficulties in achieving positive changes in physical activity measures.^{37–38}

What is already known on this topic

- Greek children exhibit low physical activity levels, which are associated with an alarmingly high prevalence of obesity and an adverse cardiovascular risk profile
- The school environment may be able to contribute to effective countermeasures to improve physical fitness and promote health education

What this study adds

- Comprehensive school health education programmes can help pupils to establish healthy physical activity patterns
- The promotion of physical activity behaviours during childhood may prevent some of the main causes of morbidity and mortality in the Greek population, and thereby decrease healthcare costs and improve quality of life

This could be attributed to the poor design or the inadequate implementation of the intervention, the inability of the children to use the self management skills they were taught, or the high physical activity levels reported at baseline.³⁷ The difficulty of obtaining valid and reliable measures of physical activity in children in general may also partly account for this discrepancy.

The present findings should not be judged independently of the overall lifestyle modification during the past two decades in Greece. Diminished physical activity patterns are often observed among contemporary Greek children,^{7–9} and the prevalence of overweight children and adolescents in Greece seems to be among the highest in the world.⁶ Given that low physical activity levels coupled with excess body fat are significant predictors of developing coronary heart disease,³⁹ the present data indicate that public health interventions such as ours, targeting the promotion of children’s physical activity, are of major importance for future public health.

It is reasonable to assume that these results may have been influenced by methodological limitations such as the restriction of the study to a single school district and/or seasonality in physical activity. The effect of seasonality in physical activity was accounted for by using the past-year physical activity recall questionnaire, which provides information for the entire previous year. Finally, our results should be interpreted with some caution, as they are based on a study of a relatively small number of participants.

Despite the study’s limitations, the data show that comprehensive school health education programmes have the potential to slow the age related decline in physical activity and help pupils establish healthy physical activity patterns. Combining a health education programme with PE classes optimises both physical activity and health promotion components of the programme, allowing more hours of intervention. Given that attitudes towards physical activity acquired at an early age persist through adolescence into adulthood,⁴⁰ these data suggest that promoting healthy habits and behaviours during childhood may prevent some of the leading causes of morbidity and mortality in the Greek population, decrease direct healthcare costs, and improve quality of life.

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