

EVALUATION OF A SCHOOL-BASED INTERVENTION
PROGRAMME TO PROMOTE PHYSICAL ACTIVITY: AN
APPLICATION OF THE THEORY OF PLANNED BEHAVIOR¹

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Summary.—The Theory of Planned Behavior provides a useful framework to study attitudes toward participation in physical activity. The objective of the study was to test the effectiveness of an intervention in manipulating the variables of the Theory of Planned Behavior and exercise habits with 366 high school students ($M = 14.2$ yr., $SD = .7$; 201 boys and 165 girls). The students were divided into intervention and control groups. A questionnaire to measure components of the theory, and the Baecke Questionnaire of Habitual Activity measuring exercise habits, were administered. The intervention lasted 12 wk. and included posters and lectures promoting participation in physical activity. Analyses showed the intervention was effective in improving attitudes towards physical activity, perceived behavioral control, intention, and self-reported actual behavior, but it was ineffective for improving attitude strength, subjective norms, and role identity. The results provide useful information for physical education teachers interested in promoting students' positive attitudes towards physical activity.

The health benefits of participation in physical activity are well documented (Dishman, 1982; Blair, Kohl, Gordon, Paffenbarger, Clark, Cooper, & Gibbons, 1989). Inactivity is related to a variety of physical (Hansen, Froberg, Hyldebrandt, & Nielson, 1991; Dattilo & Kris-Etherton, 1992; Nieman, 1995) and psychological dysfunctions (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Schmitz, French, & Jeffery, 1997). Also, Rhodes, Courneya, and Jones (2002) proposed that activity may influence individuals' personality traits. Increasing physical activity is therefore an important goal. A number of theories have been proposed and used to explain and predict individuals' physical activity behavior. Prominent among these is the Theory of Planned Behavior (Ajzen, 1988), which has been shown to be effective in different settings and populations (for review see the meta-analyses of Hausenblas, Carron, & Mack, 1997; Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002). This theory proposed to "account for behavior of various kinds by reference to a relatively small number of concepts" (Ajzen & Fishbein, 1980, p. 4).

The theory of planned behavior is an extension of Ajzen and Fishbein's

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(1980) theory of reasoned action to include voluntary behaviors. The theory suggests that the most immediate and important predictor of behaviour is individuals' intention to execute a behaviour. To define the construct better and to distinguish it from expectation, Warshaw and Davis (1985) discussed the formulation of conscious plans to perform or not perform the behaviour. Different studies have shown that intention accounts for approximately 30% of the variance in behaviour (Armitage & Conner, 2001; Hagger, *et al.*, 2002). However, the question of which variables are related to effective goal pursuit has not been definitely answered. Behavioural intention has been predicted by three variables: attitudes towards the activity, subjective norms, and perceived behavioral control. Attitudes towards the activity describes a person's overall evaluation of performing the behavior in question (personal element), whereas subjective norms describe the pressure posited by the social environment to perform a specific activity (social element). Perceived behavioral control represents the perceptions of the individual regarding the ease or difficulty of performing a given activity. Godin (1993) estimated that this last construct accounts for approximately 8% of the variance in intention, supporting Ajzen (1985) who had included the construct to enhance the predictive validity of the theory of reasoned action. Although the relation of the perceived control construct with Bandura's self-efficacy or Rotter's locus of control component is apparent (Sideridis, Kaissidis, & Padelidou, 1998; Ajzen, 2002), recent results suggest empirical advantages in the distinction of perceived behavioral control and self-efficacy (Armitage & Conner, 1999; Trafimow, Sheeran, Conner, & Finlay, 2002).

To assess the relative importance of the various constructs and to increase the predictive utility of the model, additional predictors have been included, as suggested by Ajzen (1991) and other researchers (Jackson, Smith, & Conner, 2003). For example, Theodorakis (1994), based on previous research by Raden (1985) and Charng, Piliavin, and Callero (1988), argued that the association of attitudes towards the activity and subjective norms on intention is likely mediated by attitude strength and role identity, respectively. The attitude strength variable includes several dimensions of attitudes which according to Raden (1985), and Krosnick, Boninger, Chuang, Berent, and Carnot (1993) should be measured for a more comprehensive understanding of attitudes. Such dimensions are the certainty, intensity, accessibility, and the importance of individuals' attitudes as well as knowledge and information about the activity. Researchers have disagreed with one another about the latent constructs reflected by these dimensions and suggested application of a multifactor model to account for their intercorrelations (Krosnick, *et al.*, 1993). Role identity describes the integration of a repeated behaviour into the self-concept of the individual, hence, a dimension of self (Theodorakis, 1994). Theodorakis and his associates (Theodorakis, 1994;

Theodorakis, Bagiatis, & Goudas, 1995), and Jackson, *et al.* (2003) have provided evidence for the mediating role of these variables in physical activity contexts.

To measure physical activity and exercise behaviour different methods and inventories have been used (Baecke, Burema, & Frijters, 1982; Blair, Haskell, Ho, Paffenbarger, Vranizan, Farquhar, & Wood, 1985; Godin & Shephard, 1985; Folsom, Jacobs, Caspersen, Gomez-Martin, & Knudsen, 1986; Jacobs, Ainsworth, Hartman, & Leon, 1992). However, quantification of the recommended amount of physical activity for gain and maintenance of health and the development of more specific behavioural plans in different settings has not been settled. Some researchers suggest objective measures (Armitage & Conner, 2001), while others prefer use of more traditional approaches (Brenes, Strube, & Storandt, 1998).

Research has indicated that planned behavior theory provided a useful framework for the prediction and better understanding of behaviour in several life settings, such as health and education (Armitage & Conner, 2001) and exercise (Hausenblas, *et al.*, 1997). Regarding exercise contexts, the meta-analyses conducted by Hausenblas, *et al.* (1997) and Hagger, *et al.* (2002) indicated that, if individuals form a strong intention to participate in physical activities, then participation is more likely to occur. Intention is largely influenced by attitudes towards activity and perceived behavioral control, while the role of subjective norm is moderate.

The consistency found in the literature regarding the positive effect of attitudinal variables on intention and that of intention on later exercise behaviour led researchers to the notion that participation in physical activity can improve if the perceived value of such activity is enhanced. Also, Baranowski, Anderson, and Carmack (1998) underlined the advantages of explanatory models of exercise and physical activity for the application of adequate interventions. Studies conducted in different settings have shown that intervention programs can change attitudes toward exercise (Brodie & Birtwistle, 1990) and other healthy behaviours (for a review, see Godin & Kok, 1996; Hardeman, Johnston, Johnston, Bonetti, Wareham, & Kinmonth, 2002).

These interventions have been applied in several target groups and used several features. For example, Smith and Biddle (1999) applied 90-min. sessions for 10 wk. to promote adherence in sedentary adults. Each session included a lecture, a training circuit, and discussion, all aiming to manipulate cognitive, emotional, and behavioural components of attitudes. The analyses did not identify significant differences in exercise behaviour, but qualitative data indicated some improvement in attitude towards exercising and intention to be physically active.

In educational settings, Rizzo and Vispoel (1992) attempted to change

the attitudes of university students towards teaching handicapped individuals. The strategies used to change attitudes included (a) information through reading, lectures, and class discussion, (b) teaching handicapped individuals, (c) vicarious experience by simulating handicapped situations, and (d) persuasive messages via media, reading, and lecture. Analyses indicated that the application of this multifaceted approach resulted in improvement of attitudes about teaching handicapped students.

In the context of school physical education, Brodie and Birtwistle (1990) examined the effect of a health-related fitness measurement program on children's attitudes about physical activity, exercise, health, and fitness. The intervention included 20–35-min. sessions and integrated the features of the Davies Health Related Fitness Programme which emphasizes physiological issues. Analyses indicated that the incorporation of a health-related fitness program can improve positive attitudes toward physical activity and might make a valuable contribution in physical education classes. In yet another study, Patterson and Faucette (1990) investigated the role of the physical education teacher in improving children's attitudes towards physical activity. Specialist versus nonspecialist physical education teachers taught a variety of tasks to high school students. Their efforts yielded no significant differences between the two groups, suggesting that physical education teachers' experience is not a crucial factor in attitudes about physical activity.

The literature review has indicated that attitude change might occur in educational settings such as university and high school settings. However, the reported interventions were limited to the change in attitudes without associating them with behavioral indices, such as actual performance. The planned behavior theory provides a sound theoretical framework to study attitudes in conjunction with behavior itself. Smith and Biddle (1999) used this framework and, despite the limitations of the study due to small sample and lack of a control group, they concluded that this theory could be important in measuring the effectiveness of health-related programs. Therefore, the aim of the present study was to examine the effectiveness of an intervention program targeting the cognitive, emotional, and behavioural components of attitudes towards exercise in a physical education context under the planned behavior theory. It was expected, following interventions with suitable manipulation of the attitude toward the behavior, attitude strength, perceived behavioral control, subjective norms, role identity, and intention to exercise, that behavior would be improved. More specifically, the objective was to test whether scores on measures of attitude toward exercise and attitude strength, role identity, perceived behavioral control, and subjective norms are improved by this planned school intervention. A follow-up of self-reported exercise behaviour should show improvement in daily activity level as well.

METHOD

Participants

The sample consisted of 366 students (M age = 14.2 yr., SD = .69; 174 boys, M age = 14.3 yr., SD = .7; 188 girls, M age = 14.0 yr., SD = .7). Four students did not report their age. At the time of the study, these students were attending four schools in an urban city of northern Greece. The students of two schools were assigned to the intervention group (n = 195, M age = 14.0 yr., SD = .7), while the students of the other two schools served as the control group (n = 171, M age = 14.2 yr., SD = .7). After the intervention two classes (n = 152) were randomly selected from each school to participate in a follow-up measure (n = 85 students from the intervention group and n = 67 students from the control group, respectively).

Measures

The extended model of the theory of planned behavior, which includes measures of intention, attitudes toward behavior, subjective norms, perceived behavioral control, role identity, and attitude strength was used. These constructs have been repeatedly used to study attitude and behaviour in Greek samples (Theodorakis, 1992, 1994; Theodorakis, *et al.*, 1995; Bebetos, Papaioannou, & Theodorakis, 2003; Kosta, 2003; Tabaki, Barkoukis, & Rodafinos, 2004). To evaluate the constructs, Likert-type scaling and Thurstone scaling were used. However, regarding item formulation, Ajzen's suggestions (2002)² were taken into account. Kosta (2003), who examined in a study of 71 high school students the psychometric properties of all the scales in the extended model, reported satisfactory results (α s > .67).

Intention.—For the evaluation of subjects' intention three items were used: "I intend/I will try/I am determined to participate in physical activities for at least 3 times a week in the next three months." Responses were given on a 7-point scale anchored by 1 = Very Unlikely and 7 = Very Likely, for the first item and anchors of 1 = Disagree and 7 = Agree for the other two items.

Attitudes Toward Behavior.—Attitudes toward participation in physical activity were measured by the statement "I think participation in physical activities for at least 3 times a week in the next three months is . . ." Responses were given on five bipolar adjectives (useless–useful, difficult–easy, unimportant–important, pleasant–unpleasant, and boring–interesting). The participants responded on a 7-point scale, with low scores indicating negative attitudes.

Subjective norms.—Normative beliefs were estimated via three items. Responses to the stem, "My participation in physical activities for at least 3

²Ajzen, I. Constructing a TpB questionnaire: conceptual and methodological considerations. <http://www-univ.oit.umass.edu/~ajzen/polif/tpb.measurement>.

times a week in the next three months has the approval . . . ,” were rated regarding three referents, parents and relatives, friends, and teachers. Responses were given on a 7-point scale anchored by 1 = Not at All and 7 = Very Much.

Perceived Behavioral Control.—Control beliefs were measured by three questions with responses based on anchors of 1 and 7 as follows: (a) “If I wanted to, I could participate in physical activities for at least 3 times a week in the next three months” (1 = Very Unlikely and 7 = Likely), (b) “How much control do you believe you have over participation in physical activities for at least 3 times a week in the next 3 mo.” (1 = Very Little Control and 7 = Complete Control), and (c) “For me participation in physical activities for at least 3 times a week in the next 3 mo. would be . . .” (from 1 = Impossible and 7 = Possible).

Role Identity.—Role identity was assessed using three statements: “I would feel that I lost something, if I could not participate in physical activities for at least 3 times a week in the next 3 mo.,” “Participation in physical activities for at least 3 times a week in the next 3 mo. is an important part of my life,” and “Participation in physical activities is a way I express myself.” Responses were rated on a 7-point Likert-type scale with anchors of 1 = Disagree and 7 = Agree.

Attitude Strength.—Attitude strength was estimated with six statements on a 7-point Likert-type scale: (a) “How certain are you that you will participate in physical activities for at least 3 times a week over the next 3 mo.?” with responses anchored by 1 = Very Uncertain and 7 = Very Certain; (b) “To participate in physical activities for at least 3 times a week over the next 3 mo. is one of my priorities” with anchors of 1 = Strongly Disagree and 7 = Strongly Agree; (c) “I have the will needed to participate in physical activities for at least 3 times a week over the next 3 mo.” with anchors of 1 = Strongly Disagree and 7 = Strongly Agree; (d) “How interested are you in participating in physical activities for at least 3 times a week over the next 3 mo.?” with anchors of 1 = Not At All and 7 = Very Much.

Exercise habits.—With respect to the action element of the model, Ajzen² suggested focusing on exercising in general. Thus, exercise habits were assessed using the Baecke Questionnaire of Habitual Activity (Baecke, *et al.*, 1982). The questionnaire includes a pool of 16 items, which evaluate physical activity habits in three sections: in the workplace (e.g., “In my free time between classes, I sweat”), sports (e.g., “If you play sports, which sports do you play most frequently”), and nonsports leisure activity (e.g., “During leisure time, I ride a bicycle”). The items used to assess physical activity habits were appropriately modified to describe better the context of school. Responses were given on a 5-point Likert scale, anchored by 1 = Never and 5 = Very Often. School physical education was classified as low activity. The

level of habitual activity was estimated based on the equation reported by Baecke, *et al.* (1982) where each item is weighed and a total score, Exercise Habits, is produced. Scores on the questionnaire have been found to correlate with scores on the Four-week Physical Activity History and Cardiorespiratory Fitness (Jacobs, *et al.*, 1992), a finding that supports its validity. The questionnaire was chosen because it measures exercise behaviour and physical activity in relevant contexts of students’ lives as suggested by Ajzen², namely, school, sport, and leisure time because habits of exercising seem to be reliable predictors of exercise behaviour (Godin, Valois, Shephard, & Desharnais, 1987) and because it has been adapted and used in the context of Greek school-sport and showed satisfactory psychometric properties (Bar-koukis, 2000).

Intervention

The main purpose of the intervention program was to support cognitive, emotional, and behavioural components of the subjects’ attitudes toward physical activity, that is, to provide basic knowledge and tips for safe and effective participation in physical activities, such as the necessary frequency and intensity of fitness programs, to develop positive emotions about participation in physical activities and negative emotions for inactivity and unhealthy lifestyles, and to encourage students to participate in physical activities inside and outside of the school. Specifically, it was expected that the above strategies would affect behavioural characteristics and that this might reflect attitudinal change.

The intervention lasted 12 wk. In the context of Greek school physical education this translates into 36 lessons. Similar interventions have been extended 8 to 16 wk. (Courneya & McAuley, 1995; Anderson, Cox, McKellar, Reynolds, Lean, & Mela, 1998; Estabrooks & Carron, 1998). The specific features of the intervention were lectures and posters, as suggested in previous studies (see Brubaker & Wickersham, 1990; Anderson, *et al.*, 1998; Kerr, Eves, & Carrol, 2001).

Lectures

After a systematic review of studies applying the theory of planned behavior, Hardeman, *et al.* (2002) argued that persuasion and information were the most frequently used methods for change followed by goal setting and rehearsal of the skill. Based on this assertion, participants in the intervention group received three 45-min. lectures. The first one occurred at the first week of the intervention and provided information on the strategies that could be used to change behaviour and to exercise effectively, i.e., using the stairs, setting a personal goal for improvement, and checking one’s improvement. The second lecture took place in the fourth week of the intervention and taught specialized procedures of personal goal-setting and kinds of be-

havioural management, i.e., specify realistic goals, draw up a behavioural contract, and clarify decision-making processes. The third lecture took place in the eighth week of the intervention and provided information regarding the benefits of exercise and the negative consequences of inactivity and an unhealthy lifestyle, such as obesity. Each lecture was followed by an interactive discussion and question-and-answer session asking the participants to clarify misconceptions regarding exercise and healthy lifestyles. Students were given the presentation material and written messages for further study.

Posters

A poster was placed on the announcement board of each class every week. The announcement board was next to the blackboard, so students could observe the posters during both class hour and breaks. The posters were created to stimulate mainly the cognitive, emotional, and behavioural aspects of subjects' attitudes. For example, one poster represented the game of Monopoly, where each step reflected a tip, e.g., control your weight by exercising, or information regarding exercise, e.g., if you have exercised three times this week, move two steps forward; another poster showed an open mouth bingeing large quantities of unhealthy foods such as fried potatoes, sweets, and unhealthy beverages.

Physical Education Teachers

A leaflet was administered to the physical education teachers of the intervention group concerning opportunities to participate in out of school physical activity, e.g., health and sport clubs or newly introduced sports in Greece such as badminton and baseball. They were instructed to provide this information to the students during stretching. Physical education teachers were also instructed to accentuate values and standards connected with health improvement and exercise behaviour during their classes (for similar recommendations, see Sallis, Patrick, Frank, Pratt, Wechsler, & Galuska, 2000). The content of the leaflet and the values recommendations were explained to the physical education teachers in two 2-hr. seminars.

Procedure

The students completed the questionnaire three times: (a) Measurement 1 at the beginning of the second semester of the academic year, (b) Measurement 2, 12 wk. after the first measurement and completion of the intervention, and (c) 4 to 6 wk. after the intervention (Follow-up measure). Trained personnel and the physical education teachers supervised the procedure. Both oral and written instructions were given to the students on how to complete the questionnaire. Students were reassured of the confidentiality of their responses. Further, the introduction pointed out that participation in physical activities means regular physical activity behavior of approximately one hour, and that it is very important to remain attentive while they fill in

the questionnaire. At the end of the follow-up measure interactive discussions in two physical education classes were held. Students and teachers reported their experiences of participation in the intervention program. Students of the control group participated in typical physical education classes.

RESULTS

Descriptive and Multivariate Statistics, Correlations, and Cronbach Alphas

Table 1 contains adjusted scale means of the second wave, after covariance analyses controlled for the first wave. Also, *F* ratios, *dfs*, and significance from the covariance analysis of the second measurement and the follow-up measurement were included.

TABLE 1
ADJUSTED SCALE MEANS OF SECOND WAVE COVARIANCE ANALYSES CONTROLLING FOR FIRST WAVE

Measure	<i>M</i>	<i>SE</i>	<i>F</i>	<i>df</i>	<i>p</i>	η^2	Follow-up Measurement		
							<i>F</i>	<i>df</i>	<i>p</i>
Intention	14.96	.32	15.78	359	.001	.04	.32	152	ns
Attitude	28.82	.28	18.67	357	.001	.05	3.20	152	ns
Subjective Norms	15.06	.25	.46	357	.50		.16	152	ns
Perceived Behavioral Control	16.31	.24	26.47	355	.001	.07	.33	152	ns
Role Identity	13.43	.30	.92	355	.34		1.03	152	ns
Attitude Strength	16.07	.34	1.97	359	.16		2.08	152	ns
Exercise Habits	11.21	.28	14.04	355	.001	.08	2.90	152	ns

Note.—*M* = estimated marginal means; *SE* = standard error, η^2 = partial eta squared, ns = non-significant.

The Pearson product-moment correlations of the planned behavior variables are presented in Table 2. In both measurements, low to medium correlations emerged (*r*s ranged from .15 to .71) among the variables, except for Subjective Norms, which was not significantly correlated with scores on Intention and Attitude. The highest correlations were found between Role Identity and Attitude Strength, in both the first and second measurements. All other correlations observed in the first measurement were low, except correlations between Perceived Behavioral Control and Role Identity, and Attitude Strength, which were medium. In the second measurement, medium correlations were found between rated Intention and Attitude, Perceived Behavioral Control, Role Identity, and Attitude Strength. Also, medium correlations emerged between rated Attitude and Perceived Behavioral Control, Role Identity, and Attitude Strength. Finally, Attitude Strength had shown the highest correlation coefficients with rated Perceived Behavioral Control and Role Identity.

Regarding exercise habits, low but significant correlations emerged only for rated Role Identity and Attitude Strength in the first measurement. Contrary to this, several significant correlations among exercise habits and con-

TABLE 2
PEARSON PRODUCT-MOMENT CORRELATIONS FOR TWO MEASUREMENTS* AND CRONBACH
ALPHAS FOR FIRST (M_1) AND SECOND (M_2) MEASUREMENTS

Measure	αM_1	r							αM_2
		1	2	3	4	5	6	7	
1. Intention	.95		.44	.28	.58	.47	.55	.29	.94
2. Attitude	.78	.50		.22	.51	.47	.58	.08	.81
3. Subjective Norms	.71	.15	.18		.24	.33	.28	.11	.72
4. Perceived Behavioral Control	.78	.63	.53	.22		.47	.61	.25	.83
5. Role Identity	.83	.49	.47	.30	.50		.71	.24	.85
6. Attitude Strength	.92	.69	.58	.26	.70	.69		.27	.93
7. Exercise Habits		.13	.11	.07	.05	.23	.23		

Note.—Correlation coefficients larger than .15 are statistically significant at $p < .001$. *First measurement below the diagonal, second measurement above the diagonal.

structs of theory of planned behavior appeared in the second measurement. More specifically, scores on Intention, Perceived Behavioral Control, Role Identity, and Attitude Strength were low but positively related with exercise habits.

Intervention Effects

To examine differences between intervention and control groups for the dependent variables (Intention, Attitude, Perceived Behavioral Control, Subjective Norms, Role Identity, Attitude Strength, and Exercise Habits) multivariate analyses of covariance were computed. To control for initial differences, the same variables assessed before the intervention were used as covariates in each analysis. Wherever significant differences emerged, follow-up analyses of covariance were computed (cf. Table 1). The above-mentioned statistical procedures have been suggested for use when dependent variables are correlated (Buehl & Zoefel, 2002).

Analysis for rated Intention showed that, after adjusting for initial differences ($F_{1,294} = 9.29$, $p < .001$), there were statistically significant between-group differences ($F_{1,359} = 15.78$, $p < .001$, $d = .97$). The subjects in the intervention group had more positive intentions than those in the control group.

Regarding Attitudes Toward Exercise, the analysis of covariance with the first measure as a covariate ($F_{1,294} = 12.34$, $p < .001$) showed statistically significant differences on attitudes toward exercise. The subjects in the intervention group reported more positive attitudes toward exercise than those in the control group.

Furthermore, the analysis of covariance regarding Perceived Behavioral Control indicated that, after adjusting for differences on the first measure ($F_{1,294} = 17.02$, $p < .001$), there were statistically significant mean differences between the intervention and control groups. Subjects in the former group scored higher on Perceived Behavioral Control than those in the control group.

As far as Exercise Habits were concerned, after adjusting for mean differences on the first measure ($F_{1,294} = 6.92$, $p < .001$), there were statistically significant between-group differences. Compared to the control group, participants in the intervention group reported higher means.

The analyses of covariance indicated no statistically significant mean differences between the groups in Attitude Strength, Role Identity, and Subjective Norms.

Follow-up Study

The analysis of covariance was used again to test for possible differences between the groups at the second and follow-up measurements. Analysis indicated no significant mean differences on any of the variables assessed after adjusting for possible initial differences. Students of the intervention group compared with those of the control group had higher scores on the theory of planned behavior variables than on the second measurement.

DISCUSSION

The present study was designed to examine the effectiveness of an intervention program to change students' attitudes toward physical activity participation using the theory of planned behavior. Analysis showed significant mean postintervention changes on attitudes, perceived behavioral control, intention, and self-reported exercise habits, but not on means for Subjective Norms, Attitude Strength, or Role Identity.

In the theory of planned behavior, the attitudes toward activity represent the cognitive and emotional components of attitudes. Hence, the improvement reported after the application of the intervention implied that posters and lectures could be effective strategies to change these components. These strategies provided information about the benefits of exercise and the negative outcomes of a sedentary and unhealthy lifestyle. Similar to studies of Patterson and Faucette (1990) and Rizzo and Vispoel (1992) the findings indicated that further knowledge on the activity present could lead to the development of more favourable attitudes towards this activity. Also, the relative importance of exhibiting the positive effects of exercise and providing tips (cognitive component) versus showing the negative outcomes of unhealthy lifestyle (emotional component) was not examined. The combination of both strategies was effective in changing subjects' self-reported attitudes towards participation in physical activities in the time frame. Researchers may compare efficiency to identify the most effective behavioural change strategy. In sum, the above finding provides support for Jackson, *et al.*'s proposition (2003) that interventions should target changing attitudes.

Also, the intervention was effective in enhancing subjects' Perceived Behavioral Control. The tips for exercise and other related healthy behaviors, i.e., weight control, and information on where and how adolescents could exercise, seemed to improve the subjects' perceptions about their ability to

control their behavior. In Greece, there is no formal agency providing information on physical and sporting activities in each region or providing cues for proper exercising. Thus, many adolescents do not know where to look for opportunities to exercise and may view exercise as a habit associated with physical fatigue and exhaustion. In the present study, adolescents were informed about the numerous opportunities for exercise that are available, in addition to the well-known sports such as football, basketball, and volleyball, and that exercise does not necessarily mean strenuous daily training. Although not measured, these strategies may have increased subjects' feelings of competence about performing certain physical activities and thereby increased their sense of being able to control their environment and participate in these activities.

The lack of association of the intervention with subjects' actual behaviour has been strongly associated with its influence on their intention to participate in physical activities. Planned behavior theory has consistently shown that intention is the strongest predictor of behaviour (Godin, 1993). The present intervention modified subjects' intention to participate in physical activities as, subsequently, differences in the actual participation were reported. These findings might be ascribed mainly to the fact that the questionnaire measures different facets of performing physical activity (Jacobs, *et al.*, 1992) and shows sensitivity and ability to capture participation in low intensity physical activity. It is common for Greek high school students to display minimum effort during physical education lessons to avoid high intensity.

However, caution should be given in over-interpreting the above result. Armitage and Conner (2001) concluded that subjective measures such as this self-report of physical activity overestimate behaviour. Other researchers suggested focusing on limited classes of physical activity performed in specific situations (Baranowski, *et al.*, 1998). Thus, objective and specific measures of behaviour may be more informative in assessing changes in exercise behaviour than the present one, which also evaluates other aspects of students' daily lives. Also, social conformity to what is healthy must be clarified. Attention should be paid to these issues.

On the other hand, the results of this study indicated that the intervention was not effective in changing Subjective Norms, Role Identity, and Attitude Strength. As far as the Subjective Norms are concerned, the intervention program targeted subjects' attitudes and did not include their social environment and pressures. Therefore, it would be expected that parents' and peers' attitudes about exercise would not necessarily be affected as much as the subjects' change in perceptions. Because parents control the outdoor activities of their children to a large extent (Ryan & Stiller, 1991), it is obvious that significant others play an important role in maintaining an

observed change. Given the important role of 'significant others' and the social influences in the formation of adolescents' intention and behaviour (Ajzen, 1988; Smith, Sondhaus, & Porzelius, 1995; Hausenblas, *et al.*, 1997; Smith & Biddle, 1999; Hagger, *et al.*, 2002), later interventions should incorporate education of members of the social environment on the behaviour at hand, i.e., provide information to parents about the benefits of exercise and the negative outcomes of unhealthy lifestyles.

Theodorakis (1994) defined role identity as the integration of a repeated behaviour into the self. If an individual is not systematically engaged in an activity, then this activity is not prompted to become part of the role identity. However, researchers suggested (Thoits & Virshup, 1997) that subjective norms are a multifaceted construct which represents distinct components, e.g., personal, role, and social identities, and that different strategies might be used to improve these components of self. Moreover, the amount of social support and the relative size of one's social network are basic sources of variations in role identities (Charng, *et al.*, 1988). With the exception of the physical education teachers' support, there was no other special treatment in the intervention. It appears that the processes of role identity changes would require more time for formation and stabilization of the internal sources which influence exercise behaviour. Also, prior researchers stated that, when behaviour becomes important to a person's sense of self, then the perceived opinions of others may become less influential (Charng, *et al.*, 1988). Perhaps this may account for the nonsignificant effect on Role Identity in this study, consistent with Jackson, *et al.*'s findings (2003). Researchers might carefully examine the role of sporting experiences (past behaviour) in those populations.

The failure of the intervention to improve subjects' attitude strength might be ascribed to the difficulty in understanding consequences and personal desirability of each of these consequences on their physical and psychological health. For example, subjects of this age have no clear understanding of the importance of participation in physical activities or that such behaviours ought to be of utmost priority. Present strategies would not increase confidence, certainty, and importance of this evaluation, according to the subjects' reports. Perhaps controlled goal-setting techniques might be a more appropriate way to increase the strength of these attitudes.

Even if no clear recognized methods of behavioural change were used, according to the teachers' observations following the interventions, the dropout rate from the physical education classes was reduced. Answers to an open-ended question showed that students found the intervention very interesting and useful in daily life. This is consistent with Michie and Abraham's arguments (2004) that observable behavioural change is the best criterion of effectiveness of behavioural intervention. Nevertheless, they asked for a 'theory-specified technology of behavior change' (p. 35).

Researchers agreed that the theory of planned behavior may have potential for developing behavioural change interventions and concluded that further study is needed to compare the utility of the theory with others and social cognition models, such as health belief model and self-efficacy theory (Hardeman, *et al.*, 2002). Several authors suggested adoption of physical activity follows a pattern of change in several stages (Prochaska & DiClemente, 1983; Brawley & Rodgers, 1993; Courneya & Bobick, 2000). The Transtheoretical Model (Prochaska & DiClemente, 1983) has been effectively applied to evaluating intervention regarding condom use in the context of the theory of planned behavior (Bowen, 1996; Kourneya, Plotnikoff, Hotz, & Birkett, 2001). Although some questions arose recently regarding the distinctions between stages (Sutton, 2000; Armitage, Povey, & Arden, 2003), this model might provide a framework to suggest that individuals should be encouraged to go from one stage to another in successive sequence. This would allow an individual to be guided step by step towards the adoption of exercise and healthy behaviour.

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