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A one-year intervention in 7th grade physical education classes aiming to change motivational climate and attitudes towards exercise

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Abstract

Objectives: To assess the effects of a year-long intervention in Greek junior high school physical education on motivational climate, goal orientations and attitudes towards exercise and healthy diet.

Design: One-year pre-post experimental trial.

Method: Eighty-eight daily lessons aiming to facilitate task-involvement were developed with 262 students in an intervention group and 521 acting as controls. All were at the first year of junior high school (7th grade). The intervention was assessed through questionnaires at the beginning and end of the school year and 10 months after the end of the intervention. Participants completed the measures of motivational climate, goal orientations and attitudes.

Results: Confirmatory factor analyses, and reliability and correlation analyses, supported the psychometric properties of the questionnaires. Covariance analysis results revealed that, after adjusting for initial differences on the assessed constructs, students who took part in the intervention, compared with the control group: (1) had more positive attitudes towards exercise and healthy eating, (2) had lower ego and higher task orientation scores, and (3) perceived that their teacher gave more emphasis on task-involvement and less emphasis on ego-involvement.

Conclusions: Physical educators can create a positive motivational climate facilitating students' task orientation and attitudes towards exercise.

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Keywords: Motivational climate; Physical education; Intervention; Attitude change; Goal orientations

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Attitudes are people's perceptions, ideas or judgments concerning a specific behaviour. Theory and research in social psychology imply that attitudes predict behaviour (Ajzen, 1988). The adoption of an active lifestyle is often associated with positive attitudes towards exercise. Thereby, the formation of positive attitudes towards exercise is important, taking into consideration the fact that regular exercise has been shown to be beneficial for public health. Since the 1980s there have been supporters of the notion that physical education should facilitate positive attitudes towards exercise (see Biddle, 1987). Indeed, a recent longitudinal study involving thousands of Greek students showed that a positive attitude towards exercise was a positive predictor of youngsters' exercise behaviour 7 and 14 months later (Papaioannou, 2000).

Several studies have revealed that attitudes can be altered through practice and acquired knowledge (e.g., Theodorakis, Goudas, & Kouthouris, 1992). It is also known that attitudes can change following increased understanding (Ajzen, 1988). Physical educators, therefore, can play an important role in facilitating positive attitudes towards exercise through appropriate educational activities (Ferguson, Yesalis, Pomrehn, & Kirkpatrick, 1989).

Choosing the appropriate pedagogical strategies might be a critical issue when attitude change is pursued. Over the last 10 years, a number of studies in Greek physical education have revealed that, as children get older, they show decreasing scores on effort and enjoyment of the lesson, feel less competent, become less task-involved in the lesson and their exercise frequency decreases (Digelidis & Papaioannou, 1999; Papaioannou, 1997). Many physical educators are concerned about this situation. Some of them are struggling to enhance students' motivation and facilitate positive attitudes towards exercise and health issues. Nevertheless, it is doubtful how far they can go within the limits that are set by the existing curriculum.

Greek physical education in grades 3–12 is largely sport-oriented, with competitive activities and team sports dominating the curriculum (*Physical Education Curriculum for the High School*, 1990). Based on the achievement motivation literature (Duda, 1996; Roberts, 2001), one can hypothesize that curricula based almost exclusively on competitive activities or on a sport education model (Siedentop, 1994) will decrease the motivation of students with low athletic ability. Some may feel in a disadvantageous position and form negative attitudes towards exercise. In addition, a highly ego-involving environment could also be problematic for the high-ability student because it is likely to promote extrinsic motivation (Kavussanu & Roberts, 1996) and decrease moral functioning (Kavussanu, 1997).

This study, therefore, was based on goal perspectives theory (Nicholls, 1989). According to this approach, two goals predominate in achievement settings such as physical education. When a task goal is salient children try to improve their competence, feel satisfied when they develop new skills, ascribe high value to effort and view mistakes as part of the learning process. An ego goal implies a major concern with the issue of normative ability. Children try to demonstrate their competence in a normative sense. They try to outperform others or exhibit a high normative performance, or claim success with little effort. They feel satisfied when they appear competent and experience negative emotion when they fail to demonstrate high ability.

Research has established that goal perspectives differ between individuals and across contexts. High task-oriented students are more intrinsically motivated than low task-oriented students (Roberts, 1992, 2001). The perception of a high task-involving climate is positively related to students' intrinsic motivation in physical education (Duda, 1996). On the other hand, the perception of an ego-involving climate is linked with higher levels of somatic anxiety (Papaioannou &

Kouli, 1999) and the belief that ability is an important determinant of achievement (Van Yperen & Duda, 1999). These findings imply that the creation of a high task-involving climate should be a priority for teachers if they want to maximize students' intrinsic motivation.

There have been few attempts to create and assess a task-involving climate in physical activity research (e.g., Lloyd & Fox, 1992; Solmon, 1996; Theeboom, De Knop, & Weiss, 1995). There are no reports of successful interventions concerning the motivational climate of the physical education lesson aiming to change students' attitudes towards exercise. In a 7-month intervention in elementary schools, when the teacher emphasized a task-involving climate, students' interest in the lesson increased and positive attitudes towards physical education were facilitated (Papaioannou & Digelidis, 1998).

It was hypothesized, therefore, that a physical education programme built on guidelines for the creation of an adaptive motivational climate (Papaioannou & Goudas, 1999; Treasure & Roberts, 1995) would positively affect students' perception of a task-involving climate, task-orientation, interest in the lesson, and attitudes towards exercise.

Method and procedure

Participants

Students ($n = 262$) in the 7th grade took part in the intervention programme (130 boys, 132 girls). They were aged 11–14 years ($M = 11.88 \pm 0.60$) and from four high schools in Northeastern Greece. One school was in a rural area, one in a semi-urban area and two in urban areas. Four physical educators taught these students. There were at least two different classes for each teacher (10 classes in total). Teachers were informed about the purpose of the intervention through a letter that was sent to 100 schools, and they voluntarily chose to participate in the intervention. A control group comprised 520 7th graders (245 boys, 276 girls), aged 11–14 years ($M = 12.14 \pm 0.77$), from 19 high schools in Greece, almost all of them in urban areas. Nineteen physical education teachers taught these students. All physical education classes were coeducational. Students participated in physical education lessons three times per week for 45 minutes each lesson. The study was conducted with the permission of the Greek Ministry of Education and with agreement of students and teachers.

Procedure

The intervention programme lasted one academic year and included seminars for teachers and the design of daily lesson plans. More than 70 lesson plans were designed for teaching skills and games and 17 lessons for health and exercise issues, including lectures, activities and attitude change strategies. Most lessons consisted of both lecture and practice.

The intervention was based on implications stemming from the TARGET model (Epstein, 1989; Treasure & Roberts, 1995), as well as guidelines offered by Papaioannou and Goudas (1999). The acronym TARGET (Task, Authority, Rewards, Grouping, Evaluation, Timing) is a useful tool to classify dimensions of motivational climate, but it cannot cover the whole range. For example, the use of cognitive strategies, such as mental rehearsal, is supposed to facilitate task-

involvement (Ames & Archer, 1988; Solmon & Lee, 1997) but it cannot be classified according to the TARGET model. Hence, cognitive strategies and the adoption of a personal goal-setting programme described below were also considered (Papaioannou & Goudas, 1999).

Teachers were also instructed to use criteria of individual progress and mastery for providing evaluative feedback but there was no specific intervention concerning the criteria for grading students. Unfortunately, permission from the Ministry of Education to change grading strategies was not forthcoming.

The intervention had the following features:

1. *A personal goal-setting programme* was introduced to students. At the beginning of the school year, students were measured in four areas, which were called health indices in order to reduce or avoid perceptions of evaluation: (i) the multistage 20 metre shuttle run test for aerobic fitness (Leger, Mercier, Gadoury, & Lambert, 1988), (ii) Eurofit's flexibility test (*Eurofit-Eurotest for the Assessment of Physical Fitness*, 1992), (iii) Eurofit's sit-up test and (iv) body mass index. Students kept these records in their personal physical education notebook and they set personal goals for improvement. It was clear to them that these records were considered personal data and would not be used for grading.
2. *Students exercised in stations* and usually in groups of four to six persons in order to maximize academic learning time. There were no long lines or queues. Task cards were developed for each station and students were taught specific protocols to avoid time wasting during transition from one station to another. Increased academic learning time has found to be related to perceived emphasis on task-involvement (Papaioannou, 1993). In each station students had choices to enhance their self-determination (e.g., "choose which exercises you would like to do").
3. *Goal-oriented activities*. Process goals were used to direct students to perform the correct movement pattern of a skill. Moreover, product goals directed students to achieve an outcome that was usually expressed in numbers. Product goals can be classified as either competitive, co-operative or personal development goals (Papaioannou & Kouli, 1999). Competitive goals were avoided but co-operative and personal development goals were used extensively. Research shows that these kinds of activity facilitate the creation of a task-involving atmosphere (Papaioannou & Kouli, 1999).
4. *The reciprocal style of teaching* was used (Mosston, 1966) in order to enhance communication between students and further co-operation. Students were organized in pairs or groups of three where one of them undertook some of the teacher's tasks (e.g., giving feedback to the other two by using a criterion form that the teacher had prepared).
5. *The percentage of competitive tasks* was very low compared with the percentage of co-operative and individualized tasks.
6. *Teachers were instructed* to emphasize with their students, through discussion, values connected with task orientation, such as personal improvement, co-operation, health-improvement and exercise behaviour. In the teaching material there were frequent reminders to reinforce these values.
7. *Self-talk, mental imagery and relaxation techniques were applied* to several activities. These cognitive strategies are positively linked with the perception of a high task-involving climate (Solmon & Lee, 1997).
8. *Lessons connecting health and exercise were designed* according to suggestions of Theodorakis

and Goudas (1997). Through these lessons teachers had the chance to increase the knowledge of their students concerning the health benefits of exercise but they also emphasized positive feelings during exercise and the importance of positive social relations. Taking into consideration that healthy nutrition and exercise are health-enhancing behaviours and they are conceptually related (Sallis et al., 2000), tutorials regarding healthy nutrition and its link with healthy physical activity were also included.

9. *Intervention took place concerning the quality and quantity of students' interactions.* This was to minimize times when students were excluded from taking part in the activity. For example, when both girls and boys participated in the same team game, the teacher could set a rule like "the ball goes boy–girl–boy–girl" in order to ensure that all students would participate as actively as possible during the game.

The role of physical educators

In order to assist teachers in their work, a programme of seminars, meetings and regular communication was developed. Teachers had the freedom and the autonomy to choose the unit or the lesson that they were to teach depending on their schedule and school's facilities. Also, they had the autonomy to make adaptations to the programme but keeping the philosophy of a task-involving climate. In fact, teachers were encouraged to participate actively and adapt the programme to the particular school facilities and equipment. Teachers reported that only few adaptations took place.

Communication with teachers

Two 6-hour seminars were organized, concerning the philosophy and the principles of the intervention. Afterwards, there was regular communication between researchers and teachers, at least twice a month by phone, once a month personal contact with each teacher separately and counselling meetings every two months. Six lessons from each teacher were video-taped and were used to provide feedback for the teacher.

Measures

Three measurements were taken three times: (1) first wave: at the beginning of the school year (three to four weeks after the beginning of the year; that is, after the first six to 12 physical education classes of the new year), (2) second wave: by the end of the school year (during May), and (3) third wave: about 10 months after the end of the intervention (the following March). It should be noted that the year after the intervention all teachers who participated in the intervention moved to other schools. Hence, in the 10-month follow-up period after the intervention, the students in the experimental classes did not have the teacher who applied the intervention programme during the previous year.

Teacher-Initiated Motivational Climate in Physical Education Questionnaire

Perceptions of the motivational climate were used to ascertain whether the intervention was effective in creating a particular psychological climate. The motivational climate was measured with a short version of the Learning and Performance Orientations in Physical Education Classes

Questionnaire (LAPOPECQ) (Papaioannou, 1994, 1998). It consists of two scales referring to perceptions of teacher-initiated motivational climate. The first seven-item scale assesses perceptions of teacher's emphasis on students' task-involvement (e.g., the PE teacher is completely satisfied when every student's skills are improving) and the other six-item scale measures perceptions of teacher's promotion of an ego-involving climate (e.g., the PE teacher attends to the best records only). Following the stem 'In this physical education class', responses to the items were indicated on a five-point Likert-type scale (5 = *strongly agree*, 1 = *strongly disagree*). The reliability and construct validity of this instrument are described in the results.

Goal orientations

These were measured using the Task & Ego Orientation in Sport Questionnaire (Duda, 1989). The instrument has been appropriately adapted to Greek physical education (Papaioannou & Macdonald, 1993; Papaioannou & Theodorakis, 1996). Following the stem 'I feel most successful in physical education when...', students indicated their responses to 13 items on a five-point scale (*I absolutely agree* = 5, *I absolutely disagree* = 1). This instrument has two factors: (1) task orientation (e.g., I feel most successful in physical education when... I learn new skills) and (2) ego orientation (e.g., I feel most successful in physical education when... I come first).

Enjoyment and reported effort

Two subscales of the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989) were used to measure students' perceived effort (e.g., I put all of my effort into the PE lesson) and enjoyment (e.g., I enjoy the PE lesson very much). Students responded to 10 items on a five-point scale (*I absolutely agree* = 5, *I absolutely disagree* = 1). Responses to the three negative items of these scales were excluded from further analyses because they decreased the alpha reliability of the scales. Results from previous studies in Greek physical education support the validity and reliability of these scales (Digelidis & Papaioannou, 1999).

Self-perceptions

The 'sport competence' and 'attractive body' subscales of the Physical Self-Perception Profile (Fox & Corbin, 1989) were used to measure self-perceptions. The sports competence scale consisted of six items (e.g., I am one of the best when it comes to sport). Students reported on a five-point scale (*exactly as I am* = 5, *I am not at all like this* = 1). The attractive body scale included six items (e.g., compared with the majority, I have an attractive body). The students indicated their responses on a five-point scale (*certainly yes* = 5, *certainly no* = 1). In previous studies in Greece, young sports participants scored higher on these subscales than youngsters who were not involved in sport (Digelidis & Papaioannou, 1999). These data offer some initial support for the validity of the scales in Greece.

Behaviour

All students answered on two six-point scales assessing frequency of exercise and eating fruits in the previous month (*not at all* = 0, *one to five* = 1, *five to ten* = 2, *ten to fifteen* = 3, *fifteen to twenty* = 4 and *more than twenty* = 5). Regular exercise was described as intensive out-of-school exercise at least twice a week for one hour or more. It was explained that intensive

exercise is when the pulse increases to more than 120, and this occurs when students participate in physical activities such as basketball, football, aerobics or swimming.

Attitudes

The Planned Behaviour Theory Questionnaire (Ajzen, 1988), adapted to the Greek language from Theodorakis (1994), was used. Students indicated their attitudes towards exercise and eating fruits in the next 12 months on four seven-point semantic differentiation scales (good–bad, healthy–unhealthy, pleasant–unpleasant, useful–not useful), scored from *very good* = 7 to *very bad* = 1.

Intentions

For each of the above-mentioned behaviours, students indicated their intentions for the next 12 months. The following two items were used: “I intent to exercise/eat fruits regularly during the next 12 months” (*possible* = 7, *impossible* = 1) and “I’m determined to exercise/eat fruits regularly during the next 12 months” (*absolutely yes* = 7, *absolutely no* = 1). Similar measures of intention have been used in previous studies in the Greek physical activity context showing sound psychometric properties (Theodorakis, 1994).

Results

Confirmatory factor analyses and reliabilities

Confirmatory factor analyses were computed in order to establish the two-factor structure of the instruments assessing goal orientations and perceptions of teachers’ emphasis on task-involvement and ego-involvement. Using the EQS software (Bentler, 1992), each observed variable was freed for the factor that it was assumed to assess and fixed to zero for the other factor. No correlated residuals were permitted. The goodness-of-fit indices, which are considered to be relatively unaffected by sample size (Bentler, 1992; Marsh, Balla, & McDonald, 1988), showed that the instruments fitted the data well (see Table 1). Alpha reliability coefficients showed that all

Table 1
Goodness-of-fit indices for the two-factor models

	χ^2/df	df	χ^2/df	NFI	NNFI	CFI
Goal orientations—wave 1	91	64	1.42	0.88	0.95	0.96
Goal orientations—wave 2	110	64	1.72	0.88	0.93	0.95
Goal orientations—wave 3	129	64	2.02	0.87	0.91	0.93
Perception of teacher’s emphasis on goal orientations—wave 1	105	64	1.64	0.86	0.92	0.94
Perception of teacher’s emphasis on goal orientations—wave 2	149	64	2.33	0.88	0.91	0.93
Perception of teacher’s emphasis on goal orientations—wave 3	157	64	2.45	0.85	0.88	0.90

Note: NFI, normed fit index; NNFI, Bentler–Bonett non-normed fit index; CFI, comparative fit index.

scales had acceptable internal consistency (>0.60) apart from the scale assessing attitudes towards exercise at the first wave ($\alpha = 0.56$).

Correlations

Pearson product moment correlations among the dependent variables assessed at the first and second wave appear in Table 2. The pattern of positive associations among perceptions of teacher's promotion of task-involvement, task orientation, effort and enjoyment in the physical education lesson and attitudes towards exercise support the construct validity of these measures. As was also expected, the perceptions of teacher's promotion of ego-involvement were positively associated with students' ego orientation. Similar correlation patterns emerged in the second and third wave.

Intervention effects

Silverman and Solmon (1998) have suggested that, when conducting any type of intervention in physical education, the unit of analysis should be the class instead of the student. Nevertheless, in studies like the present one, we are not examining class differences but student differences, precisely because the intervention focuses on each particular student, not just on the class as a whole. In this study, most of the daily lessons included small group or individual-based activities, requiring from the teacher personal contact with each student. Students pursued personal goals. Individualized teaching was the principle precisely because this is the norm for the creation of a high task-involving climate. Moreover, within each class, depending on individual differences in goals, students ask different questions, behave differently and receive different teacher feedback. During a whole year, within the same class each student accumulates many different experiences from his/her personal interaction with their teacher compared with their classmates. Hence, during a whole year each student is treated in a unique way.

In this paper, differences between experimental and control classes in individual student outcomes such as effort, enjoyment, self-perceptions, attitudes, intentions, behaviours and goal orientations were examined using the student as the unit of analysis. Differences between experimental and control classes concerning perceived motivational climate were examined using both the student and the class as the unit of analysis.

Multivariate analyses of covariance (MANCOVAs) were computed to examine differences between experimental and control groups in the dependent variables; that is, the variables assessed at the end of the intervention. In each analysis, the same variables assessed before the intervention were used as covariates in order to control for initial differences. In each MANCOVA the following dependent variables were used: attitudes towards exercise and eating fruits, intentions towards exercise and eating fruits, exercise and eating behaviours, goal orientations, perception of teachers' emphasis on task and ego-involvement, effort and enjoyment. Where significant differences emerged ($P < 0.05$), follow-up ANCOVAs were computed. It should be mentioned here that controlling for differences assessed after the first six to 12 physical education lessons of the year is a conservative approach. Some of the intervention effects could have been already registered. Nevertheless, it would be meaningless to ask students about issues concerning their teacher, class and class climate before the start of the year.

Table 2
Pearson product moment correlations; wave 1 below the diagonal, wave 2 above the diagonal

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Task orientation														
2. Ego orientation	0.24													
3. Perceived teacher's emphasis on task-involvement	0.53	0.07												
4. Perceived teacher's emphasis on students' ego-involvement	0.04	0.28	-0.00											
5. Attitudes towards exercise	0.25	-0.02	0.25	-0.00										
6. Attitudes towards eating fruits	0.10	-0.06	0.15	-0.08	0.25									
7. Intentions towards exercise	0.30	0.03	0.21	-0.00	0.36	0.13								
8. Intentions towards eating fruits	0.13	-0.07	0.15	-0.07	0.19	0.59	0.12							
9. Exercise behaviour	0.10	0.07	0.03	0.00	0.06	-0.02	0.34	0.06						
10. Eating fruits	0.10	0.02	0.12	-0.08	0.11	0.04	0.07	0.18	0.12					
11. Effort	0.54	0.11	0.45	0.04	0.11	0.00	0.24	0.01	0.11	0.11				
12. Enjoyment	0.48	0.09	0.41	-0.03	0.19	0.04	0.27	0.09	0.13	0.06	0.570			
13. Perceived athletic ability	0.32	0.29	0.21	0.13	0.12	-0.05	0.21	0.01	0.29	0.04	0.22	0.24		
14. Perceived physical attractiveness	0.27	0.35	0.26	0.37	0.10	-0.03	0.17	0.05	0.20	-0.01	0.24	0.19	0.42	

Note: Correlation coefficients larger than 0.20 are statistically significant, $P < 0.001$.

In the first analysis, results revealed that, after adjusting for differences on the first measure [$F(1,661) = 39.3, P < 0.001$], there were statistically significant between-group differences in exercise attitudes [$F(1,661) = 6.66, P < 0.01$]. The adjusted means appearing in Table 3 imply that the students of the experimental group, compared with the control group, had more positive attitudes towards exercise.

The ANCOVA results concerning attitudes towards eating fruits revealed that, after adjusting for differences on the first measure [$F(1,666) = 22.22, P < 0.001$], there were statistically significant differences between experimental and control groups [$F(1,666) = 3.70, P < 0.06$]. The students in the experimental group had more positive attitudes towards eating fruits than the students in the control classes.

After adjusting for differences [$F(1,532) = 33.56, P < 0.001$], statistically significant between-

Table 3
Adjusted scale means of the second wave after covariance analyses controlling for the first wave

	Schools participating in intervention		Schools with typical PE curriculum	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
<i>Attitudes towards...</i>				
...Exercise	6.66*	0.057	6.49*	0.032
...Healthy nutrition	6.82* ^a	0.086	6.69	0.031
<i>Intentions towards...</i>				
...Exercise	5.92	0.091	5.94	0.051
...Healthy nutrition	6.56	0.085	6.47	0.047
<i>Perceived behavioural control towards...</i>				
...Exercise	5.84	0.087	5.90	0.049
...Healthy nutrition	6.61	0.079	6.54	0.044
<i>Behaviour</i>				
Exercise frequency	3.06	0.104	3.15	0.058
Eating fruits frequency	2.92	0.100	2.74	0.057
<i>Intrinsic motivation</i>				
Effort	4.13	0.071	3.99	0.039
Enjoyment	4.15	0.070	4.21	0.038
<i>Self-perceptions</i>				
Perceived athletic ability	3.30	0.078	3.45	0.041
Perceived physical attractiveness	3.58	0.067	3.62	0.037
<i>Goal orientations</i>				
Task orientation	4.34*	0.054	4.14*	0.031
Ego orientation	2.71*	0.078	2.90*	0.044
<i>Perceived motivational climate</i>				
Perceived teacher's emphasis on students' task-involvement	4.33*	0.070	4.13*	0.036
Perceived teacher's emphasis on students' ego-involvement	2.61**	0.086	3.01**	0.045

Note: *, $P < 0.05$; **, $P < 0.001$. *M*, estimated marginal means; *SE*, standard error.

^a $P < 0.06$.

group differences emerged in the perception of teacher's emphasis on students' task-involvement [$F(1,532) = 6.58, P < 0.05$]. According to expectations, students of the intervention group, compared with the control group, had higher scores on this measure.

The results concerning perceptions of teacher's promotion of an ego-involving climate showed that, after adjusting for initial differences [$F(1,564) = 90.88, P < 0.001$], there were statistically significant differences between the two groups [$F(1,564) = 17.41, P < 0.001$]. Students of the intervention group, compared with the control group, had lower scores on the perception of teacher's promotion of an ego-involving climate.

After adjusting for differences [$F(1,563) = 96.01, P < 0.001$], there were statistically significant differences between the two groups in ego orientation [$F(1,563) = 4.61, P < 0.05$]. The adjusted mean of the ego orientation scale for students in the experimental group was lower than the control group.

The initial ANCOVA revealed no significant between-groups differences in task orientation. Examining the school means on task orientation, it emerged that the scores in one experimental school were much lower than the scores in the remaining three intervention schools. One could assume that task orientation in one particular subject is partially affected by school climate. In other words, if the general school climate in this particular school was low task-involving, students' task orientation in physical education would also have been affected. Hence, it was decided to exclude the students from this school from the analysis and compute the ANCOVA again. The results revealed that, after adjusting for differences [$F(1,502) = 47.68, P < 0.001$], there were statistically significant differences between the control and three intervention schools [$F(1,502) = 5.14, P < 0.05$]. The students in three schools of the intervention group, compared with the control group, had higher scores in task orientation (Table 3).

There were no significant differences in students' intentions and behaviour between experimental and control groups. Finally, there were no differences in intrinsic motivation or self-perceptions between the two groups.

In order to examine differences in perceived motivational climate at a class level, the class average scores of the perceptions of teacher's emphasis on students' task- and ego-involvement were computed. A new file was developed, including the means of 44 classes (10 experimental and 34 control) for these two climate scales. The first ANCOVA showed that, adjusting for initial differences [$F(1,41) = 5.69, P < 0.05$], there were statistically significant differences between the two groups [$F(1,41) = 4.10, P < 0.05, \eta^2 = 0.09$], in the perceived teacher's emphasis on task-involvement. The intervention classes, compared with the control classes ($M = 4.31, SE = 0.09$), had higher scores on the perception of teacher's emphasis on task-involvement ($M = 4.08, SE = 0.05$).

The second ANCOVA revealed that, controlling for initial differences in the perceptions of teachers' emphasis on ego-involvement [$F(1,41) = 3.80, P < 0.06$], there were significant differences between the two groups [$F(1,41) = 7.42, P < 0.01, \eta^2 = 0.16$]. The intervention classes had lower scores ($M = 2.69, SD = 0.10$) than the control classes ($M = 3.02, SD = 0.05$).

As has been already mentioned, the above results are conservative. After six to 12 physical education lessons from the start of the academic year and the intervention respectively, important experimental effects on class climate should have already occurred. This is evident from analyses of variance using the class average climate scores at the end of the year as dependent variables and the condition (experimental–control) as independent variable. The differences between experi-

mental and control classes were considerable for task-involving climate [$F(1,41) = 6.70, P < 0.01, \eta^2 = 0.14$; experimental: $M = 4.36, SD = 0.20$; control: $M = 4.07, SD = 0.33$] and large for ego-involving climate [$F(1,41) = 10.90, P < 0.001, \eta^2 = 0.21$; experimental: $M = 2.64, SD = 0.28$; control: $M = 4.03, SD = 0.33$].

Follow-up study

Similar statistical analyses were followed to examine possible differences between experimental and control classes in the dependent variables assessed at the third wave (10 months after the end of the intervention). It is emphasized that in the following academic year all teachers of experimental classes moved to other schools and the new physical education teachers were not trained on how to apply a task-involving climate.

No between-group differences emerged, apart from perceptions of teacher's emphasis on ego-involvement. More specifically, after adjusting for possible initial differences [$F(1,190) = 1.67, P > 0.05$], 10 months after the end of the intervention there were statistically significant differences between the two groups [$F(1,190) = 4.05, P < 0.05$]. Students of the intervention group ($M = 2.69, SE = 0.15$), compared with the control group ($M = 3.03, SE = 0.08$), continued to have lower scores on the scale assessing perceptions of teacher's promotion of an ego-involving climate.

Discussion

Most of the major goals of this intervention were achieved. The intervention was effective in creating a stronger task-involving climate and decreasing perceptions of teachers' emphasis on ego-involvement. After the end of the intervention, students in the experimental classes had more positive attitudes towards exercise and eating fruits, they were less ego-oriented and the students of the three teachers were more task-oriented than the students in the typical classes.

The present study revealed that attitude change strategies in physical education (Theodorakis & Goudas, 1997) could be effective through the appropriate pedagogical environment. This is the first study in Greek physical education showing that teacher's strategies, if they consistently apply them for almost one academic year, can play an important role in the facilitation of exercise and nutrition attitudes.

One of the main directions for the teachers was to point out the relationship between exercise and health as frequently as possible. In order to achieve this, health-related lectures and frequent health-related reminders were included in the teaching material. For example, when students were exercising on sit-ups, the teacher could remark "our abdominals help in good posture". Another example, when students were running, the teacher could remark that "now we are improving endurance". There were reminders for the teachers to give as many such messages as possible. This has been suggested to be beneficial in attitude change (Theodorakis & Goudas, 1997).

There were no differences between experimental and control groups in students' intentions or behaviours. The study was not designed to have a direct effect on students' exercise intentions and behaviours. Social cognitive models (e.g., Ajzen, 1988; Bandura, 1977) or recommendations

for promoting physical activity (e.g., Centers for Disease Control and Prevention, 1997) imply that students' exercise intentions and behaviours change when the intervention sets specific goals for exercise and directs students to participate in out-of-school exercise programmes. As explained, this was not permitted by the Ministry of Education.

Students' perceptions of teacher's promotion of an ego-involving climate were lower in the intervention group compared with the control group. This finding could be partly attributed to the limited competitive activities in the intervention programme. Moreover, it could be ascribed to the structure of the high task-involving classes. Students participating in low task-involving physical education classes are frequently involved in unsupervised competitive activities that can sustain high levels of ego orientation (Papaioannou, 1993). On the other hand, the emphasis on personal progress could possibly distract students' attention from social comparison. Finally, teachers' reinforcement of the value of task-involvement when ego-oriented behaviours took place could contribute to the decrease of students' ego orientation and perceptions of an ego-involving climate.

The overemphasis on competition in physical education has been critiqued from by researchers and physical educators (e.g., Brown & Grineski, 1992). Many students may feel incompetent or unpleasant when they are asked to compete (Coakley, 1990, pp. 62–80). Competitive activities do not ensure equal opportunities for learning for every student (Graham, 1992) and may not contribute to the learning process.

Teachers in the intervention classes were instructed that if they wanted to introduce a competitive activity they should emphasize team co-operation, fair play and equal opportunities for students' participation instead of only praising the best performers or the winners. They were also requested to pass messages like "winning can make you feel good but co-operating with everybody can make you happy" or "competition is a means for enhancing personal improvement".

The intervention was effective in sustaining a task-involving climate. In this one-year intervention several strategies were used in order to achieve this outcome. The aim of the study was to affect as many dimensions of the class climate as possible, taking into consideration the background of the teachers, the existing curriculum and the available resources. At this stage it is not clear which strategy had a major influence on the climate. The goal-setting techniques appear to affect perceptions of motivational climate (Papaioannou & Kouli, 1999). Nevertheless, these can have short-term effects if students do not realize the benefits of exercise and health-related fitness improvement.

Students' task orientation, at least for three out of four schools participating in the intervention, was higher when compared with the control group. These results are similar with those of a previous study (Papaioannou & Digelidis, 1998). It is safe to suppose that all four teachers of the intervention were highly motivated to follow the directions and accepted the philosophy of the curriculum. Teachers' interviews (Digelidis, Papaioannou, & Della, 2001) revealed similar conclusions about the adoption of the philosophy of the programme. However, for some unknown factors, the students of one teacher were less task-oriented than the students of the other three teachers. It should be mentioned here that the role of teachers in the cultivation of students' task orientation is rather small. In this study, the perception of teacher's emphasis on task-involvement explained less than 28% of the variance of students' task orientation (Table 2). Several other factors facilitate students' task orientation, such as parents, siblings, peers, media and coaches (Papaioannou, 2000). Although this teacher created a task-involving climate in the lesson, some out-of-class factors may have intervened to have undermined the teacher's efforts.

Nevertheless, 10 months later almost all intervention effects disappeared. In other words, following the change of physical education teachers and the return to the typical physical education lesson, the gains in attitudes, cognitions and perceptions were largely lost. These results also imply that a high task-involving climate should be sustained longer, perhaps during all school years, in order to have positive long-term effects. It could be also argued that a high task-involving climate in just one lesson is not enough to sustain long-term effects. A high task-involving climate in all lessons is probably required in order to have strong effects on students' task orientation (Ames, 1992). Ten months after the intervention, the only existing difference referred to the perception of teacher's promotion of an ego-involving climate. Students in the intervention groups still had lower scores than students in the control classes.

The creation of a task-involving climate throughout the grades 1–12 is not an easy process. In a recent study (Papaioannou & Kouli, 1999), 20 physical educators attended a short goal perspectives theory seminar and then they were asked to describe five ego-involving drills and five task-involving drills respectively. Unfortunately, none of them was able to describe correctly a single task-involving activity. On the other hand, it was very easy to them to find ego-involving activities; that is, the activities that they used everyday in their classes. There is a gap between the knowledge now acquired in sport psychology and teachers' level of knowledge and ability to create a task-involving climate in school. This also implies that intervention plans concerning teachers' education should be developed.

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