

THE ROLE OF SELF-DETERMINATION THEORY VARIABLES IN PREDICTING MIDDLE SCHOOL STUDENTS' SUBJECTIVE VITALITY IN PHYSICAL EDUCATION

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Abstract: The study examined the extent to which levels of students' subjective vitality in compulsory physical education (PE) may be predicted by behavioural regulations and multidimensional amotivation beliefs in relation to PE and whether the psychological needs for autonomy, competence and relatedness mediate the relationship of perceived autonomy support by the PE teacher with motivational regulations and multidimensional amotivation. Data were collected from 416 7th and 8th grade students including boys and girls. Regression analyses showed that significant predictors of students' vitality were identified regulation, intrinsic motivation, and task characteristics amotivation beliefs. Further, psychological need satisfaction mediated the relationship of perceived autonomy support by the PE teacher with motivational regulations and multidimensional amotivation.

Key words: Self-determination theory, Children, Positive affect, Physical activity

INTRODUCTION

School physical education (PE) has been viewed as a context appropriate to promote public health and to facilitate the cultivation of a positive attitude toward physical activity (Bryan & Solmon, 2007; Fox, Cooper, & McKenna, 2004; Seghers, de

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Author's note: The present study was supported by the Greek Institute for Pedagogy that granted access to the schools of the study. Thanks are also extended to the school principals, the PE teachers, and the students for their collaboration in data collection.

Martelaer, & Cardon, 2009; Tappe & Burgeson, 2004). The interpersonal style adopted by teachers and PE teachers in the context of their educational practices is reflected in the motivational climate they create in class (Cox & Williams, 2008; Digelidis, Papaioannou, Lapidis, & Christodoulidis, 2003; Katartzi & Vlachopoulos, 2011; Niemeck & Ryan, 2009; Ntoumanis & Standage, 2009; Papaioannou & Goudas, 1999). Such a climate may become a powerful determinant of children's positive motivational outcomes (Braithwaite, Spray, & Warburton, 2011; Chatzisarantis & Hagger, 2009).

Subjective vitality

Subjective vitality has been viewed as a positive feeling of aliveness and energy perceived to emanate from the self and concerns a specific psychological experience of having positive energy available to or within the regulatory control of oneself, energy possessing enthusiasm and spirit, and represents a significant indicator of personal well-being (Ryan & Frederick, 1997). In general, fun and positive affective experiences have been considered as one of the most important reasons for which children participate in physical activity and lack of fun as a critical reason for avoiding physical activity participation (Ewing & Seefeldt, 1988). Further, Pasco, Jacka, Williams, Brennan, Leslie, and Berk (2011) have shown that positive affect scores encompassing interest, excitement, enthusiasm, and alertness were associated with greater levels of physical activity participation. Therefore, given links between positive affective experiences and physical activity involvement, the provision of positive affective experiences in PE may lead to increased probabilities for future physical activity involvement.

In line with Ryan and Frederick (1997), subjective vitality is a construct falling within the conceptual domain of students' positive experiences because it emanates from intrinsically motivated behavior as conceptualized within self-determination theory (SDT, Ryan & Deci, 2002). It is assumed to emanate from an internal perceived locus of causality, that is, the perception that events or actions are a true expression of one's self. Vitality is not a direct reflection of effort that may be observed or expenditure of caloric energy since the experience of subjective vitality would not accompany efforts to accomplish a task that one is compelled to do (i.e., external perceived locus of causality). Vitality reflects autonomous behavior that actualizes and enhances one's self rather than effortful behavior that might be experienced as detracting from one's ability to behave in an autonomous way (Ryan & Frederick, 1997).

Subjective vitality is differentiated from the concept of intrinsic motivation given that intrinsic motivation has been operationalized in the context of the HMIEM (Hierarchical Model of Intrinsic and Extrinsic Motivation; Vallerand, 1997) as a set of reasons for which individuals enact a behavior; vitality falls within the category of

motivational consequences of an affective nature that is distinct from the reasons for which individuals may enact a behavior (Vallerand, 1997). In addition, as vitality is conceptualized to vary in line with levels of experienced self-determination, it is expected to be influenced by all types of behavioral regulation because different types of behavioral regulation reflect different levels of self-determined motivation. Examples of vitality items include "I feel alive and vital" and "I feel energized".

Self-determination theory antecedents of subjective vitality in physical activity

Given the assumption of SDT that feelings of vitality emanate from an internal perceived locus of causality or, put differently, autonomous motivations, the types of behavioral regulations posited by SDT to lead to feelings of vitality are the most autonomous forms of behavioral regulations such as identified regulation, integrated regulation, and intrinsic motivation rather than the less autonomous forms such as external regulation and introjected regulation. External regulation motivates behavior enacted to avoid punishment or to obtain rewards while introjected regulation underpins behavior enacted to avoid feelings of guilt or anxiety or to attain ego enhancements. Identified regulation denotes behavior perceived as important to the individual while integrated regulation reflects behavior underpinned by an integration of goals and values within the individual. Intrinsic motivation underpins behavior enacted out of feelings of fun rather than pursuing goals separate from the enjoyment of the activity. Further, the construct of amotivation has been included in the types of behavioural regulations posited in SDT reflecting a lack of intention to enact a behavior or going through the motions while enacting the behavior (Ryan & Deci, 2002). The construct of amotivation has been further broken down into more specific types of amotivation beliefs that have also been examined in PE (Shen, Wingert, Li, Sun, & Rukavina, 2010). These types of beliefs are ability amotivation beliefs grounded on perceptions of lacking ability to cope with a task; effort amotivation beliefs reflecting perceptions that individuals do not want to expend the effort necessary to enact a behavior; value amotivation beliefs grounded on a lack of appraising a behavior as important to the individual; and task characteristics amotivation beliefs reflecting a lack of interest and desirable properties in the task at hand (Shen et al., 2010). These types of specific amotivation beliefs are also assumed to detract from levels of vitality given that they operate in a fashion antithetical to self-determined motivation which is the source of feelings of vitality.

Further, the fulfillment of three innate, universal, and nonhierarchical psychological needs for autonomy, competence, and relatedness is assumed to lead to optimal motivation and psychological well being (Ryan, Williams, Patrick, & Deci, 2009). Satisfaction of the need for autonomy reflects the experience of behavior as volitional and self-endorsed. Autonomous behavior is not only intentional but also volitional. That is, individuals fully assent to engaging in their actions. Satisfaction of

the need for competence reflects a sense of effective interaction with the environment and the experience of opportunities to express or develop one's capacities. Satisfaction of the need for relatedness reflects feelings that individuals are authentically associated and experience a sense of connection with others. This experience also reflects a sense of being included and cared for by others within the domain of action and a sense of belonging in a social milieu (Niemeck & Ryan, 2009; Ryan & Deci, 2002; Ryan et al., 2009). Further, and also in line with the HMIEM (Vallerand, 1997) that outlines directional links between the SDT constructs, significant others may promote autonomous forms of motivation and weaken feelings of amotivation via the satisfaction of the needs for autonomy, competence, and relatedness by enacting behaviors that support the fulfillment of these needs. Autonomous forms of motivation are assumed to lead to a wide range of cognitive, affective and behavioral consequences. Further, given that SDT variables are viewed in three hierarchical levels of generality in measurement (i.e., the global or personality level, the domain level, and the situation level), the present study was conducted at the domain level of generality to contextualize findings in the physical education domain in general and not to any specific PE lesson.

A number of studies have examined antecedents of subjective vitality in physical activity settings. Taylor and Lonsdale (2010) have shown that in PE the relationship of autonomy support by the PE teacher to subjective vitality was mediated by psychological needs. Further, among young soccer players subjective vitality was significantly predicted by perceptions of a mastery climate, the need for autonomy, and intrinsic motivation for sport participation (Ommundsen, Lemyre, Abrahamsen, & Roberts, 2010). Vlachopoulos and Karavani (2009) showed that among exercise participants, it was only the fulfillment of the need for competence that mediated the relationship between perceived autonomy support by the exercise instructor and vitality and this effect was equivalent across men and women exercise participants. Despite that a number of studies have examined various antecedents of subjective vitality in various physical activity contexts no study to date has examined the role of the full range of SDT variables in predicting subjective vitality among students in school-based physical education. Such an endeavor would be important given that feelings of vitality are viewed as an important index of well-being and given that they emanate from autonomous forms of motivational regulation they may contribute to decisions for continued involvement in physical activity.

Therefore, the primary purpose of the present study was to examine the relative importance of motivational regulations and types of multidimensional amotivation in line with the HMIEM in predicting students' levels of trait subjective vitality in PE. A secondary aim of the study was to establish the role of the remaining variables of the HMIEM by testing the mediating role of the psychological needs for autonomy, competence, and relatedness in the relationship between perceived autonomy support provided by the PE teacher and the individual types of motivational

regulations and multidimensional amotivation. It was hypothesized that vitality would be positively predicted by the autonomous forms of behavioral regulation and negatively predicted by the specific types of amotivation beliefs. Further, the needs for autonomy, competence, and relatedness would mediate the relationship between perceived autonomy support by the PE teacher and each individual type of motivational regulation and multidimensional amotivation.

METHOD

Participants

There were 416 middle school students consisting of 219 (52.6%) boys and 197 girls (47.4%) aged between 13 and 14 years ($M = 13.51$ years, $SD = .50$). There were 207 (49.8%) 7th grade students and 209 8th grade students (50.2%). Students represented nine school classes from three middle schools (two public and one private) in a town in northern Greece. Of them, 260 (62.5%) were involved in out-of-school sport activities whereas 156 (37.5%) were not. Those involved were participating in different sports including various ball sports, cycling, tennis, swimming, wrestling and skiing participating between 1 and 7 times per week ($M = 3.30$, $SD = 1.21$) and trained between 30 min. and 180 min. ($M = 90.72$ min., $SD = 27.15$) per training session.

Measures

Perceived autonomy support. The short (6-item) version of the Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996) was used to measure students' perceptions of PE teacher's autonomy supportive behaviors (PAS) during PE. Sample items of this measure are "I feel that my PE teacher provides me choices and options in regard to the way I participate in PE" and "My PE teacher encourages me to ask questions" (see Appendix A for items in Greek). Students' responses were provided on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). An alpha value (Cronbach, 1951) of .84 has emerged in PE research with Greek middle school students (Vlachopoulos, Katartzi, & Kontou, 2011).

Psychological need satisfaction. The Basic Psychological Needs in Physical Education scale (BPN-PE; Vlachopoulos et al., 2011) was used to measure the extent to which students' psychological needs for autonomy (e.g., "I feel that the way PE is taught is the way I would like to"), competence (e.g., "I feel that I perform correctly even the tasks considered difficult by most of the children"), and relatedness (e.g., "I feel like a valued member of a group of close friends") were fulfilled in PE. The instrument comprises twelve items to measure satisfaction of the three needs using

four items per need subscale (see Appendix B for items in Greek). Responses were provided on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). Vlachopoulos et al. (2011) have provided evidence supporting the factor structure, internal reliability, nomological validity, and item meaning equivalence across boys and girls, and across students who participated or not in out-of-school sports activities.

Behavioral regulations for PE participation. To measure the types of regulations underlying students' participation in PE classes we used the Revised Perceived Locus of Causality in Physical Education scale (PLOC-R; Vlachopoulos, Katartzi, Kontou, Moustaka, & Goudas, 2011). The PLOC-R comprises nineteen items to measure students' levels of unidimensional amotivation (e.g., "I don't see why we should have PE"), external regulation (e.g., "Because in this way I will not get a low grade"), introjected regulation in the form of the motive to avoid low contingent self-worth (e.g., "Because I would feel bad about myself if I didn't"), identified regulation (e.g., "Because it is important to me do well in PE"), and intrinsic motivation (e.g., "Because PE is enjoyable") (see Appendix C for items in Greek). Students' responses were provided on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). Evidence supporting the structure of the instrument, the internal reliability of the subscales, nomological validity of scale responses and equivalence of item meaning across boys and girls and across students who either participated or not in out-of-school sports was also obtained (Vlachopoulos, Katartzi, Kontou, Moustaka, et al., 2011).

Multidimensional amotivation in PE. To measure levels of students' multidimensional amotivation beliefs in relation to their participation in PE we used the Amotivation Inventory – Physical Education (AI-PE; Shen et al., 2010). This instrument comprises sixteen items corresponding to four types of specific amotivation beliefs, that is, ability beliefs (e.g., "Because I don't have what it takes to do well in PE"); effort beliefs (e.g., "Because I don't have the energy to participate in PE"); characteristics of the task beliefs (e.g., "Because I find that the sport/activity being played is boring"); and value placed on the task (e.g., "Because participating in PE is not valuable to me") (see Appendix D for items in Greek). Students' responses were provided on a 7-point Likert scale anchored by 1 (*Strongly disagree*) and 7 (*Strongly agree*) following the stem "When you do not want to participate in PE why is that?" Initial construct validity and predictive validity evidence has been provided in favor of the AI-PE responses (Shen et al., 2010).

Subjective vitality. The individual differences version of the Subjective Vitality Scale (SVS; Ryan & Frederick, 1997) was used to measure students' levels of subjective vitality in general in PE. The scale measures levels of eudemonic well-being

in the form of having energy available to the self and feeling alive and alert (e.g., "I have energy and spirit" and "I feel alive and vital") (see Appendix E for items in Greek). The scale is unidimensional and comprises seven items with item #2 eliminated to improve the scale's effectiveness (Bostic, Rubio, & Hood, 2000). Responses were provided on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (very true). Ryan and Frederick (1997) and Bostic et al. (2000) have provided evidence supportive of the validity and reliability of the scale with reported alphas ranging from .80 to .89 while further supportive evidence has emerged when used with Greek elementary, middle school, and high school students in PE (Vlachopoulos et al., 2011).

Procedure

Access to the schools was granted by the Greek Institute for Pedagogy and the heads of the respective schools whereas parental and student consent was also secured. Students completed self-report questionnaires in a quiet classroom environment without the presence of the PE teacher. Students were assured that their responses would not affect their grades and their PE teachers would not have access to their responses. Students were also told that there were "no right or wrong answers". Participants were treated in accordance with the American Psychological Association (APA) ethical guidelines while university research regulations were adhered to. The students were informed that their participation in the research was voluntary and were assured of the anonymity and the confidentiality of their responses.

Data analysis

Initially means, standard deviations and Pearson's bivariate correlations were computed between the study variables. Confirmatory factor analysis (CFA) was used to examine the factor structure of the instrument responses for the present sample. Then, hierarchical regression analysis was used to determine the relative contribution of each of the motivational regulations and types of multidimensional amotivation in predicting students' levels of subjective vitality in PE. The first step of the regression included demographic factors such as students' gender, age, height and weight to control for their potential influence on vitality responses. In the second step, the types of behavioral regulations for participation in PE and the types of multidimensional amotivation were added.

Further, a number of regression analyses were conducted to examine the potential mediating role of psychological needs in the relationship of perceived autonomy support by the PE teacher with motivational regulations and multidimensional amotivation (Frazier, Tix, & Barron, 2004). First, a regression analysis was performed using each of the motivational regulations and types of multidimensional amotivation

as the outcome variable and perceived autonomy support as the predictor variable to establish that there is an effect to mediate. Second, each of the psychological needs was regressed on perceived autonomy support. Third, each outcome variable was regressed simultaneously on both perceived autonomy support and the three psychological needs. A reduction of the effect of perceived autonomy support on the outcome variable (i.e., motivational regulation) when psychological needs were included in the equation in comparison to the initial effect when needs were not included in the equation would provide evidence of mediation (Frazier et al., 2004).

RESULTS

Descriptive statistics and Pearson's correlations

Levels of perceived autonomy support by the PE teacher were moderate to high as were also the satisfaction of the needs for autonomy, competence, and relatedness. Amotivation and external regulation were low, introjected regulation in the form of the motive to avoid low contingent self-worth was moderate with relatively high levels of identified regulation and intrinsic motivation. All four types of multidimensional amotivation beliefs were moderate to low while reported levels of subjective vitality were relatively high. In terms of variable correlations, the values were to a large extent consistent with theoretical expectations. Positive correlations were obtained between perceived autonomy support, need satisfaction, the autonomous forms of regulations and vitality while negative correlations emerged with multidimensional amotivation. All three needs were positively correlated with autonomous types of regulations and vitality, and negatively correlated with multidimensional amotivation. The autonomous types of regulation were positively correlated with vitality and negatively with multidimensional amotivation while the controlled forms of regulations were positively correlated with multidimensional amotivation and negatively with vitality. Multidimensional amotivation was negatively correlated with vitality. Means, standard deviations and correlations between the variables along with Cronbach's alpha values (Cronbach, 1951) are presented in Table 1.

Confirmatory factor analysis of instrument responses

Confirmatory factor analysis (CFA) was used for all instruments using the EQSWIN 6.1 software (Bentler, 2003) to examine the structure of responses for the present sample. The χ^2 value was used to evaluate overall fit alongside a number of goodness-of-fit indexes such as the Comparative Fit Index (CFI) and the Root Mean Squared Error of Approximation (RMSEA) accompanied by its 90% confidence interval (RMSEA 90% CI). The variances of the factors were fixed to 1,

Table 1. Descriptive statistics, Cronbach's alpha, and Pearson's correlations between the variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>M</i>	4.93	4.61	4.89	5.36	1.83	2.79	3.70	5.45	5.29	2.07	1.92	1.93	2.10	5.25
<i>SD</i>	1.30	1.45	1.40	1.36	1.28	1.63	1.50	1.40	1.48	1.20	1.11	1.27	1.26	1.53
Cronbach's alpha	0.81	0.81	0.86	0.86	0.80	0.75	0.70	0.82	0.81	0.77	0.77	0.83	0.81	0.91
1. Autonomy support	—													
2. BPN-PE Autonomy	.62*	—												
3. BPN-PE Competence	.38*	.55*	—											
4. BPN-PE Relatedness	.35*	.47*	.55*	—										
5. PLOC-R Amotivation	-.37*	-.30*	-.20*	-.28*	—									
6. PLOC-R External regulation	-.24*	-.25*	-.13*	-.18*	.54*	—								
7. PLOC-R Introjected regulation	.09	.06	.13*	.12*	.12*	.40*	—							
8. PLOC-R Identified regulation	.50*	.51*	.50*	.42*	-.44*	-.23*	.27*	—						
9. PLOC-R Intrinsic motivation	.53*	.54*	.44*	.33*	-.45**	-.31*	.17*	.73*	—					
10. AI-PE Ability amotivation	-.22*	-.24*	-.39*	-.38*	.46*	.37*	.09	-.27*	-.30*	—				
11. AI-PE Effort amotivation	-.26*	-.24*	-.30*	-.37*	.53*	.42*	.07	-.32*	-.34*	.70*	—			
12. AI-PE Value amotivation	-.33*	-.26*	-.25*	-.32*	.64*	.44*	.07	-.38*	-.40*	.65*	.73*	—		
13. AI-PE Task amotivation	-.39*	-.41*	-.31*	-.34*	.62*	.49*	.10*	-.41*	-.51*	.66*	.74*	.82*	—	
14. Subjective vitality	.57*	.58*	.58*	.43*	-.41*	-.30*	.09	.64*	.68*	-.38*	-.40*	-.43*	-.53*	—

Note: * $p < .05$. BPN-PE = Basic Psychological Needs in Physical Education Scale. PLOC-R = Revised Perceived Locus of Causality in Physical Education Scale. AI-PE = Amotivation Inventory - Physical Education. Task amotivation = Task characteristics amotivation beliefs. All variables are measured on a 7-point scale.

the factor covariances were freely estimated, and item error covariances were fixed at zero. The Comparative Fit Index (CFI; Bentler, 1990) with a value close to .95 indicates an excellent fit to the data (Hu & Bentler, 1999) and a value of .90 or greater indicates a reasonable fit. In regard to the Root Mean Squared Error of Approximation (RMSEA; Steiger & Lind, 1980) a value less than .05 indicates a good model fit (Hu & Bentler, 1999) while a value between .08 and .10 represents an adequate fit (Browne & Cudeck, 1993; Byrne, 2000). Given the sensitivity of the χ^2 to sample size (Byrne, 2006), model fit assessment was based on the fit indexes. In general, the results provided support in favor of a satisfactory structure of the scale responses measuring perceived autonomy support, basic psychological needs in PE, behavioral regulations in PE, multidimensional amotivation beliefs in PE, and subjective vitality. Table 2 presents results on the goodness of fit indexes for each of the instruments.

Table 2. Confirmatory factor analysis results for the instruments used in the present study

CFA models	χ^2	Satorra-Bentler Scaled χ^2	df	Robust CFI	Robust RMSEA	Robust RMSEA 90% CI
Perceived autonomy support (PAS)	69.96	52.41	9	.934	.108	.081-.137
Basic Psychological Needs in Physical Education (BPN-PE)	219.18	124.03	51	.963	.059	.046-.072
Perceived Locus of Causality in Physical Education (PLOC-R)	495.38	356.82	142	.909	.060	.053-.068
Amotivation Inventory - Physical Education (AI-PE)	625.88	269.81	99	.905	.065	.055-.074
Amotivation Inventory - Physical Education (Hierarchical AI-PE)	633.11	269.17	102	.907	.063	.054-.072
Subjective vitality scale (SVS)	24.51	12.47	9	.997	.030	.000-.067

Note: $N = 416$. For the AI-PE CFA model, the correlation between the value and task characteristics factors was set to .80 to achieve model convergence. For the hierarchical AI-PE CFA model, the disturbances corresponding to the value and the task characteristics factors were set to .25 to achieve model convergence.

Prediction of vitality by motivational regulations and multidimensional amotivation

In step 1 only age and height made a significant contribution to the prediction of vitality but this contribution became non significant in the next step. In step 2 students' vitality was positively predicted by identified regulation and intrinsic motivation and negatively predicted by task characteristics amotivation beliefs (Table 3).

The mediating role of basic psychological needs

The regression analyses testing the mediating role of psychological needs supported the postulated mediating effects for all types of motivational regulations and multidimensional amotivation (Table 4). The psychological needs that mediated the relationship of perceived autonomy support with the types of motivational regulations and multidimensional amotivation were the need for autonomy for external regulation, none of the needs for introjected regulation, the needs for competence and relatedness for identified regulation, and the needs for autonomy and competence for intrinsic motivation. In terms of multidimensional amotivation, it was the needs for competence and relatedness for ability beliefs and effort beliefs and the need for relatedness for value and task characteristics beliefs. Partial mediation was evident for identified regulation, intrinsic motivation, effort beliefs, value beliefs, and task characteristics beliefs. In the cases of partial mediation, perceived autonomy support had direct effects on the outcome variables over and beyond the indirect effects via the psychological needs.

Table 3. Regression analyses predicting subjective vitality by demographics, motivational regulations and multidimensional amotivation in PE

Predictor variables	F_{change}	df	Adj. R^2	B	SEB	β	p -values	Part
Step 1	3.16	4, 341	.02					
Gender				-0.23	0.16	-0.07	.15	-.07
Age				-0.46	0.17	-0.15	< .01	-.14
Height				-0.02	0.01	0.15	< .05	.11
Weight				-0.00	0.01	-0.06	.36	-.04
Step 2	53.42	8, 333	.56					
Gender				-0.19	0.11	-0.06	.08	-.06
Age				-0.12	0.11	-0.04	.28	-.03
Height				0.01	0.00	0.08	.09	.06
Weight				0.00	0.00	-0.00	.97	-.00
External regulation				-0.01	0.04	-0.02	.67	-.01
Introjected regulation				-0.00	0.04	-0.04	.27	-.03
Identified regulation				0.40	0.06	0.36	< .01	.22
Intrinsic motivation				0.34	0.06	0.32	< .01	.19
Ability beliefs				-0.10	0.07	-0.08	.13	-.05
Effort beliefs				-0.00	0.08	-0.05	.34	-.03
Value beliefs				0.12	0.08	0.10	.13	.05
Task characteristics beliefs				-0.19	0.09	-0.16	< .05	-.07

Note: Part = Part correlation coefficients controlling for the influence of all other predictor variables in the regression equation (Hair, Black, Babin, Anderson, & Tatham, 2006). Adj. R^2 = Adjusted R squared value.

Table 4. Regression results for the mediating effects of psychological need satisfaction in the relationship of perceived autonomy support with motivational regulations and multidimensional amotivation

Outcome variable	Predictor variables	beta	p-values
<i>External regulation</i>			
	Autonomy support only	-.20	< .05
	Autonomy support	-.09	ns
	Need for autonomy	-.16	< .05
	Need for competence	.10	ns
	Need for relatedness	-.11	ns
<i>Introjected regulation</i>			
	Autonomy support only	.11	< .05
	Autonomy support	.13	ns
	Need for autonomy	-.13	ns
	Need for competence	.13	ns
	Need for relatedness	.05	ns
<i>Identified regulation</i>			
	Autonomy support only	.53	< .05
	Autonomy support	.34	< .05
	Need for autonomy	.07	ns
	Need for competence	.25	< .05
	Need for relatedness	.12	< .05
<i>Intrinsic motivation</i>			
	Autonomy support only	.54	< .05
	Autonomy support	.36	< .05
	Need for autonomy	.17	< .05
	Need for competence	.13	< .05
	Need for relatedness	.03	ns
<i>Ability amotivation beliefs</i>			
	Autonomy support only	-.22	< .05
	Autonomy support	-.10	ns
	Need for autonomy	.08	ns
	Need for competence	-.29	< .05
	Need for relatedness	-.20	< .05
<i>Effort amotivation beliefs</i>			
	Autonomy support only	-.24	< .05
	Autonomy support	-.14	< .05
	Need for autonomy	.08	ns
	Need for competence	-.16	< .05
	Need for relatedness	-.28	< .05

(continued)

Table 4 (continued)

Outcome variable	Predictor variables	beta	p-values
Value amotivation beliefs	Autonomy support only	-.32	< .05
	Autonomy support	-.28	< .05
	Need for autonomy	.08	<i>ns</i>
	Need for competence	-.09	<i>ns</i>
	Need for relatedness	-.18	< .05
<i>Task characteristics amotivation beliefs</i>	Autonomy support only	-.39	< .05
	Autonomy support	-.22	< .05
	Need for autonomy	-.13	<i>ns</i>
	Need for competence	-.05	<i>ns</i>
	Need for relatedness	-.15	< .05

Note: All regression results have been controlled for students' gender, age, height and weight. The beta coefficients for the prediction of psychological need satisfaction by perceived autonomy support from the PE teacher were .66 for autonomy, .36 for competence and .35 for relatedness, all significant at $p < .05$. The "autonomy support only" coefficient reflects the regression equation with perceived autonomy support as the only predictor.

DISCUSSION

Given the importance of positive affect for students in physical education classes, the present study examined the role of self-determination theory variables in predicting students' trait subjective vitality. The variables presently examined as predictors of vitality were the behavioral regulations for PE participation and multidimensional amotivation beliefs for PE. In terms of behavioral regulations it was identified regulation and intrinsic motivation that predicted vitality. The present findings are consistent with a plethora of research findings showing that these autonomous forms of regulation are positively associated with various positive motivational consequences including variables of an affective nature (Vallerand, 2007).

The present study also examined whether specific types of amotivation beliefs such as ability beliefs, effort beliefs, value beliefs, and task characteristics amotivation beliefs (Shen et al., 2010) would explain vitality variance. It was found that task characteristics beliefs also negatively contributed to the prediction of vitality. This means that the way students perceive the characteristics of the lesson or activities performed in PE may also play a role in their affective reactions to PE and specifically their positive feelings of energy and aliveness.

The mediating role of basic psychological needs

To provide a more complete picture of the mechanism explaining levels of students' subjective vitality in school physical education, the full sequence of variables proposed in the HMIEM was studied by examining the potential mediating role of the needs for autonomy, competence, and relatedness in the relationship of perceived autonomy support by the PE teacher with individual types of motivational regulations and multidimensional amotivation. The findings supported tenets of the HMIEM showing that the needs for autonomy, competence, and relatedness do mediate the effects of students' perceptions of autonomy support by the PE teacher with the reasons students either engage in PE classes or do not want to participate. That is, the need for autonomy mediated the relationship with external regulation showing that the more the need for autonomy is fulfilled the lower the levels of external regulation. No mediation effect was found for introjected regulation and this could be justified by the fact that introjected regulation does not reflect either high levels of controlling or high levels of autonomous motivation. The needs for competence and relatedness mediated the relationship with identified regulation. According to Ryan et al. (2009) in a context of relatedness individuals are more likely to internalize ambient values and skills. Further, the needs for autonomy and competence mediated the relationship with intrinsic motivation. Such a finding is consistent with tenets of cognitive evaluation theory positing that the needs for autonomy and competence are the needs that mainly enhance intrinsic motivation (Ryan et al., 2009).

In terms of amotivation beliefs, it was the needs for competence and relatedness that mediated the relationship with ability and effort amotivation beliefs while it was only the need for relatedness that mediated the relationships with value and task characteristics amotivation beliefs. The present findings are promising in showing that practices that may be used by the PE teacher to fulfill students' psychological needs may have potential for reducing students' levels of amotivation for participation in PE. That is, satisfying the need for competence may weaken students' not wanting to participate in PE because they feel athletically inefficient (ability beliefs) and not wanting to try hard to learn skills and achieve (effort beliefs). Further, the fact that the need for relatedness is also implicated in all four types of amotivation speaks to the importance of elements of social motivation that may contribute to students' amotivation to participate in PE and may also be linked to cognitions related to perceptions of competence and efficacy. For instance, children who are not capable in the PE lesson may be socially rejected by their peers and children who are not socially accepted by their peers may lack motivation to participate and trying hard to improve.

Practical significance of results

The present findings provide indirect support for the motivational benefits of the use

of practices supporting students' needs for autonomy, competence, and relatedness in physical education lessons. Autonomy-supportive practices may enhance autonomous forms of behavioral regulations such as identified regulation and intrinsic motivation and reduce levels of amotivation beliefs such as ability beliefs, effort beliefs, value beliefs and task characteristics beliefs (Shen et al., 2010). Teacher behaviors supportive of autonomy include minimizing evaluative pressure in class, allowing time for learning, providing choices and meaningful rationales about the usefulness of learning activities and using non controlling language (e.g., absence of "should", "must", and "have to") (Niemic & Ryan, 2009).

Limitations and future directions

The present findings apply to middle school students attending a compulsory physical education curriculum. Limitations of the study include the cross-sectional nature of the data that precludes cause-and-effect conclusions to be drawn. The present findings call for future intervention research to examine the extent to which satisfaction of students' psychological needs may lead to diminishing students' amotivation beliefs and enhancing students' autonomous behavioral regulations for participation in PE. Experimental designs should also be used to examine the extent to which practices adopted by PE teachers to satisfy students' needs for autonomy, competence, and relatedness may enhance levels of subjective vitality and how these affective experiences may contribute to the promotion of physical activity participation outside school and later in adulthood. Clearly, positive affect is an area which is understudied in the context of PE and central to a better understanding of promoting physical activity participation within and outside this context.

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APPENDIX A

**Αντιλαμβανόμενη Υποστήριξη της Αυτονομίας από
την Καθηγήτρια/τή Φυσικής Αγωγής**
(Perceived Autonomy Support by the PE Teacher,
Vlachopoulos, Katartzi, & Kontou, 2011)

Οδηγίες. Οι προτάσεις που ακολουθούν αναφέρονται γενικά στο μάθημα της γυμναστικής και όχι σε κάποια συγκεκριμένη ημέρα μαθήματος. Χρησιμοποιώντας την παρακάτω κλίμακα 1-7, παρακαλούμε σημειώστε κατά πόσο συμφωνείτε με τις προτάσεις αυτές βάζοντας σε κύκλο έναν αριθμό για κάθε μία πρόταση.

Πως βλέπεις τον γυμναστή / τη γυμνάστριά σου;	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
Στη γυμναστική...							
1. Ο γυμναστής / η γυμνάστρια με αφήνει να διαλέξω πώς να κάνω κάτι με δικό μου τρόπο στο μάθημα	1	2	3	4	5	6	7
2. Ο γυμναστής / η γυμνάστρια με καταλαβαίνει.	1	2	3	4	5	6	7
3. Ο γυμναστής / η γυμνάστρια πιστεύει ότι μπορώ να τα καταφέρνω στο μάθημα	1	2	3	4	5	6	7
4. Ο γυμναστής / η γυμνάστρια με ενθαρρύνει να κάνω ερωτήσεις	1	2	3	4	5	6	7
5. Ο γυμναστής / η γυμνάστρια με ακούει σχετικά με το τι θα ήθελα να κάνω στο μάθημα.	1	2	3	4	5	6	7
6. Ο γυμναστής / η γυμνάστρια προσπαθεί να καταλάβει αν εγώ καταλαβαίνω το μάθημα	1	2	3	4	5	6	7

APPENDIX B

Η Κλίμακα των Βασικών Ψυχολογικών Αναγκών στη Φυσική Αγωγή
 (The Basic Psychological Needs in Physical Education Scale,
 Vlachopoulos, Katartzi, & Kontou, 2011)

Οδηγίες. Οι προτάσεις που ακολουθούν αναφέρονται γενικά στο μάθημα της γυμναστικής και όχι σε κάποια συγκεκριμένη ημέρα μαθήματος. Χρησιμοποιώντας την παρακάτω κλίμακα 1-7, παρακαλούμε σημειώστε κατά πόσο συμφωνείτε με τις προτάσεις αυτές βάζοντας σε κύκλο έναν αριθμό για κάθε μία πρόταση.

Στη γυμναστική...	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
1. Αισθάνομαι ότι τα πάω κάθε φορά και καλύτερα ακόμη και στις δύσκολες για τους περισσότερους ασκήσεις	1	2	3	4	5	6	7
2. Οι σχέσεις μου με τους συμμαθητές/-τριές μου είναι πάρα πολύ φιλικές	1	2	3	4	5	6	7
3. Στο μάθημα κάνουμε πράγματα που με ενδιαφέρουν	1	2	3	4	5	6	7
4. Νιώθω ότι κάνω σωστά ακόμη και τις δύσκολες για τους περισσότερους ασκήσεις	1	2	3	4	5	6	7
5. Αισθάνομαι πάρα πολύ δεμένος/-η με τους/τις συμμαθητές/-τριες μου.	1	2	3	4	5	6	7
6. Νιώθω ότι ο τρόπος που γίνεται το μάθημα είναι και ο τρόπος που θα ήθελα.	1	2	3	4	5	6	7

(συνεχίζεται)

Στη γυμναστική...	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
7. Αισθάνομαι ότι τα πηγαίνω πάρα πολύ καλά ακόμη και στις δύσκολες για τους περισσότερους ασκήσεις	1	2	3	4	5	6	7
8. Αισθάνομαι σαν ένα σημαντικό μέλος της παρέας των παιδιών του Τμήματός μου	1	2	3	4	5	6	7
9. Αισθάνομαι ότι ο τρόπος που γίνεται το μάθημα με εκφράζει απόλυτα	1	2	3	4	5	6	7
10. Τα καταφέρνω με μεγάλη άνεση ακόμη και στις δύσκολες για τους περισσότερους απαιτήσεις του μαθήματος	1	2	3	4	5	6	7
11. Αισθάνομαι ότι ανήκω στην παρέα των παιδιών του Τμήματός μου	1	2	3	4	5	6	7
12. Αισθάνομαι ότι οι ασκήσεις που κάνουμε στο μάθημα είναι σαν να τις έχω διαλέξει εγώ	1	2	3	4	5	6	7

Κλειδί απαντήσεων: Αυτονομία: 3, 6, 9, 12. Ικανότητα: 1, 4, 7, 10. Σχέση με άλλους: 2, 5, 8, 11.

APPENDIX C

**Η Αναθεωρημένη Κλίμακα της Αντιλαμβανόμενης Εστίας του Αιτίου
στη Φυσική Αγωγή**

(The Revised Perceived Locus of Causality in Physical Education Scale,
Vlachopoulos, Katartzis, Kontou, Moustaka, & Goudas, 2011)

Οδηγίες. Οι προτάσεις που ακολουθούν αναφέρονται γενικά στο μάθημα της γυμναστικής και όχι σε κάποια συγκεκριμένη ημέρα μαθήματος. Χρησιμοποιώντας την παρακάτω κλίμακα 1-7, παρακαλούμε σημειώστε κατά πόσο συμφωνείτε με τις προτάσεις αυτές βάζοντας σε κύκλο έναν αριθμό για κάθε μία πρόταση.

Γιατί συμμετέχεις στο μάθημα της γυμναστικής;	Διαφωνώ	Διαφωνώ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ	Συμφωνώ
	απόλυτα	πολύ				πολύ	απόλυτα
1. Συμμετέχω στο μάθημα της γυμναστικής γιατί είναι ευχάριστο	1	2	3	4	5	6	7
2. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι σημαντικό για μένα να τα πηγαίνω καλά στη γυμναστική	1	2	3	4	5	6	7
3. Συμμετέχω στο μάθημα της γυμναστικής επειδή θα με ενοχλούσε αν ο/η γυμναστής/στρια νόμιζε ότι δεν είμαι καλός/ή στο μάθημα	1	2	3	4	5	6	7
4. Ειλικρινά δεν ξέρω γιατί συμμετέχω στο μάθημα της γυμναστικής	1	2	3	4	5	6	7
5. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι συναρπαστικό	1	2	3	4	5	6	7
6. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι σημαντικό για μένα να βελτιώνομαι στις ασκήσεις που κάνουμε	1	2	3	4	5	6	7

(συνεχίζεται)

Γιατί συμμετέχεις στο μάθημα της γυμναστικής;	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
7. Συμμετέχω στο μάθημα της γυμναστικής επειδή θα αισθανόμουν άσχημα αν δεν το έκανα	1	2	3	4	5	6	7
8. Συμμετέχω στο μάθημα της γυμναστικής επειδή έτσι δεν θα πάρω απουσία	1	2	3	4	5	6	7
9. Δεν καταλαβαίνω γιατί θα πρέπει να έχουμε μάθημα γυμναστικής	1	2	3	4	5	6	7
10. Συμμετέχω στο μάθημα της γυμναστικής επειδή χαίρομαι να μαθαίνω καινούργιες ασκήσεις	1	2	3	4	5	6	7
11. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι σημαντικό για μένα να είμαι καλός/ή στα αθλήματα που κάνουμε	1	2	3	4	5	6	7
12. Συμμετέχω στο μάθημα της γυμναστικής επειδή θα αισθανόμουν άσχημα αν οι άλλοι μαθητές νόμιζαν ότι δεν είμαι καλός/ή στο μάθημα	1	2	3	4	5	6	7
13. Συμμετέχω στο μάθημα της γυμναστικής επειδή έτσι δε θα θυμώσει ο/η γυμναστής/τρια	1	2	3	4	5	6	7
14. Ειλικρινά αισθάνομαι ότι χάνω το χρόνο μου στο μάθημα της γυμναστικής	1	2	3	4	5	6	7
15. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι διασκέδαση	1	2	3	4	5	6	7

(συνεχίζεται)

Γιατί συμμετέχεις στο μάθημα της γυμναστικής;	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
16. Συμμετέχω στο μάθημα της γυμναστικής επειδή είναι σημαντικό για μένα να προσπαθώ	1	2	3	4	5	6	7
17. Συμμετέχω στο μάθημα της γυμναστικής επειδή θα με ενοχλούσε εάν δεν το έκανα	1	2	3	4	5	6	7
18. Συμμετέχω στο μάθημα της γυμναστικής επειδή έτσι μας υποχρεώνει το πρόγραμμα του σχολείου	1	2	3	4	5	6	7
19. Είλικρινά δεν μπορώ να δω τι θα κερδίσω από το μάθημα της γυμναστικής	1	2	3	4	5	6	7

Κλειδί απαντήσεων: Απουσία κινήτρων: 4, 9, 14, 19. Εξωτερική ρύθμιση: 8, 13, 18. Ενδοπροβαλλόμενη ρύθμιση: 3, 7, 12, 17. Ταυτιζόμενη ρύθμιση: 2, 6, 11, 16. Εσωτερικά κίνητρα: 1, 5, 10, 15.

APPENDIX D

Το Ερωτηματολόγιο της Απουσίας Κινήτρων - Φυσική Αγωγή
(Amotivation Inventory - Physical Education, Shen et al., 2010)

Πόσο συχνά δε θέλεις να κάνεις γυμναστική στο σχολείο; (Σε παρακαλούμε κύκλωσε τη σωστή απάντηση)

Ποτέ	Λίγες φορές	Κάποιες φορές	Πολύ συχνά	Πάντα
1	2	3	4	5

Όταν δε θέλεις να κάνεις γυμναστική στο σχολείο, γιατί συμβαίνει αυτό;	Διαφωνώ απόλυτα		Διαφωνώ πολύ		Συμφωνώ πολύ		Συμφωνώ απόλυτα	
	1	2	3	4	5	6	7	
1. Γιατί δεν είμαι καλός/ή στο μάθημα της γυμναστικής	1	2	3	4	5	6	7	
2. Γιατί βρίσκω το μάθημα της γυμναστικής πολύ βαρετό	1	2	3	4	5	6	7	
3. Γιατί θεωρώ ότι το μάθημα της γυμναστικής δεν έχει ουσία	1	2	3	4	5	6	7	
4. Γιατί δεν έχω και πολλή όρεξη να προσπαθώ στο μάθημα της γυμναστικής	1	2	3	4	5	6	7	
5. Γιατί δεν αισθάνομαι ικανός/ή να τα καταφέρω στο μάθημα της γυμναστικής	1	2	3	4	5	6	7	
6. Γιατί το μάθημα της γυμναστικής δε μου αρέσει καθόλου	1	2	3	4	5	6	7	
7. Γιατί δε θεωρώ το μάθημα της γυμναστικής σημαντικό	1	2	3	4	5	6	7	
8. Γιατί δεν είμαι από τα άτομα που προσπαθούν στο μάθημα της γυμναστικής	1	2	3	4	5	6	7	
9. Γιατί μου λείπουν οι αθλητικές ικανότητες για να τα πηγαίνω καλά στο μάθημα της γυμναστικής	1	2	3	4	5	6	7	

(συνεχίζεται)

Όταν δε θέλεις να κάνεις γυμναστική στο σχολείο, γιατί συμβαίνει αυτό;	Διαφωνώ απόλυτα	Διαφωνώ πολύ	Διαφωνώ	Έτσι & έτσι	Συμφωνώ	Συμφωνώ πολύ	Συμφωνώ απόλυτα
	10. Γιατί μου φαίνεται σαν να είναι το ίδιο πράγμα στη γυμναστική κάθε φορά	1	2	3	4	5	6
11. Γιατί το μάθημα της γυμναστικής δεν έχει αξία	1	2	3	4	5	6	7
12. Γιατί δε θέλω να προσπαθήσω όσο χρειάζεται για να τα καταφέρω στο μάθημα της γυμναστικής	1	2	3	4	5	6	7
13. Γιατί οι ασκήσεις που πρέπει να κάνουμε στο μάθημα της γυμναστικής ξεπερνούν τις ικανότητές μου	1	2	3	4	5	6	7
14. Γιατί δε βρίσκω το μάθημα της γυμναστικής ενδιαφέρον	1	2	3	4	5	6	7
15. Γιατί δεν έχω κάποιο καλό λόγο να συμμετέχω στο μάθημα της γυμναστικής	1	2	3	4	5	6	7
16. Γιατί δεν έχω τη διάθεση να προσπαθώ στο μάθημα της γυμναστικής	1	2	3	4	5	6	7

Κλειδί απαντήσεων: Πεποιθήσεις ικανότητας: 1, 5, 9, 13. Πεποιθήσεις προσπάθειας: 4, 8, 12, 16. Πεποιθήσεις αξίας: 3, 7, 11, 15. Πεποιθήσεις χαρακτηριστικών του έργου: 2, 6, 10, 14.

APPENDIX E

Η Κλίμακα της Ζωντάνιας
(Subjective Vitality Scale, Ryan, & Frederick, 1997)

Παρακαλούμε απάντησε σε όλες τις ερωτήσεις και πες μας πόσο αυτές ισχύουν για σένα στο μάθημα της γυμναστικής.

	Δεν ισχύει καθόλου	Ισχύει πολύ λίγο	Ισχύει λίγο	Ισχύει μέτρια	Ισχύει αρκετά	Ισχύει πάρα πολύ	Ισχύει απόλυτα
1. Στο μάθημα της γυμναστικής αισθάνομαι γεμάτος/η ζωντάνια	1	2	3	4	5	6	7
2. Στο μάθημα της γυμναστικής κάποιες φορές έχω πολλή ζωντάνια	1	2	3	4	5	6	7
3. Στο μάθημα της γυμναστικής νιώθω πολλή ενέργεια μέσα μου	1	2	3	4	5	6	7
4. Περιμένω με ανυπομονησία κάθε φορά το μάθημα της γυμναστικής	1	2	3	4	5	6	7
5. Στο μάθημα της γυμναστικής σχεδόν πάντα νιώθω ζωντανός/ή και γεμάτος/η ενέργεια	1	2	3	4	5	6	7
6. Στο μάθημα της γυμναστικής νιώθω γεμάτος/η όρεξη να κάνω πράγματα	1	2	3	4	5	6	7

Σημ.: Το θέμα «Στο μάθημα της γυμναστικής νιώθω ότι δεν έχω ενέργεια» έχει αφαιρεθεί από την κλίμακα (βλέπε Bostic et al., 2000).