Student Intention to Engage in Leisure-time Physical Activity: The Interplay of Task-involving Climate, Competence Need Satisfaction, and Psychobiosocial States in Physical Education

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Abstract

Grounded in achievement goal theory and basic psychological needs theory, the aim of this study was to examine the interaction of perceived motivational climate in physical education with psychological needs satisfaction (relatedness, competence, and autonomy) and psychobiosocial states, on student intention to engage in leisure-time physical activity (LTPA). Participants (N = 470 Italian students, 287 boys and 183 girls, aged 16-19 years) completed the Teacher-Initiated Motivational Climate in Physical Education Questionnaire, the Psychological Needs Satisfaction Scale in Physical Education, the Psychobiosocial States Questionnaire, and a measure of intention to engage in LTPA. Structural equation modeling (SEM) analysis indicated that a perceived task-involving climate was related to intention to engage in physical activity through the serial mediation of competence need satisfaction and pleasant/functional psychobiosocial states. The findings highlight the importance of task-involving climate and competence need satisfaction in determining pleasant emotional states and, consequently, in promoting LTPA. Teachers should apply curricular and pedagogical strategies aimed to create a task-involving motivational climate, make movement experiences personally meaningful and pleasant, and therefore stimulate students to adopt an active lifestyle.

Keywords: motivation, emotion, achievement goal theory, self-determination theory, basic psychological needs theory, IZOF model

Introduction

Health benefits associated with a physically active lifestyle are well documented (Garber et al., 2011), but there is still a clear need for effective interventions to increase the levels of physical activity in the general population (Biddle et al., 2012). School physical education (PE) plays a critical role in promoting a healthy lifestyle, providing opportunities to encourage students to adopt physical activity as a pleasant regular habit in leisure time (Cavill et al., 2001; Shephard and Trudeau, 2000). Thus, in our study we examined the relationships among critical factors in PE, which were expected to positively influence student physical activity involvement at school and outside of school. Specifically, we investigated the relationships between perceived motivational climate in PE, individual motivation, and emotional experiences related to the intention to engage in leisure-time physical activity (LTPA). Theoretical frameworks, such as the theory of planned behavior (TPB; Ajzen, 1991) and the trans-contextual model of motivation (Hagger and Chatzisarantis, 2016), view intention as an antecedent of behavior. Intention to engage in physical activity or sport outside of school, considered a key outcome variable, is a good indicator and a strong predictor of motivation toward this behavior (Goudas et al., 1995). In a sample of Greek PE students, intention predicted actual exercise behavior 6 and 14 months later (Papaioannou, 2000).

Student intention to engage in physical activity outside of school has been often examined using two theoretical frameworks, achievement goal theory (AGT; Ames, 1992; Nicholls, 1984) and self-determination theory (SDT; Deci and Ryan 2000; Ryan and Deci, 2017). AGT assumes two main dispositional goals named task orientation and ego orientation, which influence the individual tendency to evaluate personal success and competence (Duda and Nicholls, 1992). Task orientation involves perceiving success in a self-referenced way, being interested in personal improvements, and attributing value to effort and commitment. In contrast, ego orientation implies perceiving success as normatively referenced, being

interested in demonstrating superior ability, and outperforming others (Duda, 1989). AGT also highlights the role of the social environment postulated to have an impact on individual dispositional goal orientation and behavior. A task-involving climate focuses on individual improvement and cooperative learning, whereas an ego-involving climate underscores social comparison and competition (Duda et al., 2014). Research findings in PE settings showed that the social situation created by teachers can determine the likelihood of students adopting task- or ego-involved goals when participating in the activity (see Roberts et al., 2007), and that perceptions of a task-involving climate can enhance the students' intention to engage in future physical activity (Escartí and Gutiérrez, 2001; Sproule et al., 2007).

In SDT, social-contextual factors are thought to be fundamental to self-motivated actions and psychological health (Ryan and Deci, 2017). Within the broad framework of SDT, basic psychological needs theory (BPNT) has been proposed as a mini-theory aimed to underline the role of social and environmental support (Deci and Ryan, 2000; Ryan and Deci, 2017). BPNT assumes that three psychological needs (i.e. relatedness, competence, and autonomy) underpin self-determined motivation, that is, the engagement in activities for the feelings of pleasure and satisfaction that derive directly from participation. According to BPNT (Ryan and Deci, 2017), relatedness is defined as the need to be connected and accepted by significant others in a specific context, competence reflects the need to effectively interact with the environment and to experience a sense of accomplishment or achievement, and autonomy refers to the individual need to experience choice and freedom in action. These basic psychological needs are viewed as essential nutrients for growth, integrity, and well-being. Using BPNT in the PE context, Standage et al. (2005) found that a need-supporting environment predicted self-determined motivation, which in turn, predicted adaptive PE-related outcomes. Self-determined motivation has been related to student optimal motivational functioning, wellbeing, and intentions to engage in physical activity outside of

school (Chatzisarantis et al., 1997; for reviews, see Curran and Standage, 2017; Van den Berghe et al., 2014).

Standage et al. (2003) provided an integrative approach to examine student intention to engage in physical activity incorporating constructs from both AGT and SDT in the setting of PE. They demonstrated that a task-involving climate fostered self-determined motivation, with the latter positively predicting LTPA intentions. AGT and SDT have been examined together to study the relationships between motivational factors and emotional states in the PE context. For example, Baena-Extremera et al. (2015) found that a task-involving climate created by teachers predicted student self-determined motivation, and this, in turn, predicted pleasant emotional states in PE classes. Pleasant states such as enjoyment, satisfaction, pleasure, and fun, have been found to be important affective variables linked to increased physical activity participation outside PE lessons (Bengoechea et al., 2010; Biddle et al., 2005; Papaioannou et al., 2006).

Emotions in achievement settings are fundamental for student motivation, learning, performance, and well-being (Pekrun and Linnenbrink-Garcia, 2014). Pekrun's (2006) control-value theory provides an integrative approach to the study of emotions experienced in academic, sport, and professional contexts. In this view, emotions are seen as multi-component, and entail a set of interrelated affective, cognitive, motivational, and physiological processes. Achievement environments, goals, and outcomes shape individual appraisals and emotions, while emotions are expected to reciprocally influence engagement and achievement (Pekrun, 2017). Pleasant emotions, in particular, can boost self-regulatory motivational and cognitive processes relevant to academic achievement and personal growth (Pekrun et al., 2009). Empirical evidence supports the predictions of the control-value theory (for a meta-analysis, see Huang, 2011).

A theoretical framework that shares some features with Pekrun's (2006) theory is the individual zones of optimal functioning (IZOF) model (Hanin 2000, 2007). The IZOF model is one of the most widely applied models to the study of subjective experiences related to performance in sport and PE settings (for a review, see Ruiz et al., 2017). Similar to the control-value theory, the IZOF model advocates a multi-component conceptualization of emotion emphasizing affective, cognitive, motivational, physiological, and relational components underlying individual experiences. The IZOF model, however, takes a more holistic approach to incorporate a wide range of idiosyncratic emotion and emotion-related psychobiosocial states. Specifically, emotional experiences are conceptualized as part of psychobiosocial states, which can be manifested through a range of eight interactive components including psychological (i.e. emotional, cognitive, motivational, volitional), biological (i.e. bodily, motor-behavioral), and social (i.e. performance, communicative) components (Hanin, 2010; see Robazza et al., 2016; Ruiz et al., 2016).

Within the IZOF model, valence or hedonic tone and functionality of psychobiosocial states are distinguished. Thus, the emotional component of a psychobiosocial state is assumed to be pleasant or unpleasant and to exert functional or dysfunctional effects on performance, while the remaining non-emotion components can be categorized as functional or dysfunctional for performance (Bortoli et al., 2009, 2011; Robazza et al., 2016; Ruiz et al., 2016). Extensive empirical evidence supports this conceptualization (see Ruiz et al., 2017). Drawing on both AGT and SDT, in the present study we assumed emotions to be a function of antecedent motivational processes. We also applied the IZOF-based conceptualization of individual experiences to the study of the interplay between perceived motivational climate in PE, individual motivation, emotional experiences, and the intention to engage in LTPA.

Study purpose and hypotheses

The aim of our study was to determine whether student pleasant/functional psychobiosocial states and psychological needs satisfaction (i.e. relatedness, competence, and autonomy) mediated the linkage between PE teacher-created task-involving climate and the intention to engage in LTPA. In Italian high schools, PE is compulsory for mixed-gender group classes, which are taught indifferently by female or male teachers. Students with disabilities are included in regular classes. Teachers take account of diversity by promoting equality and inclusion in their teaching methods. Individual performance improvements are as important as student enjoyment and commitment. Previous study findings within Italian high-school PE settings showed that both girls and boys reported higher scores in perceived task-involving climate and pleasant/functional psychobiosocial states, compared to ego-involving climate and unpleasant/dysfunctional psychobiosocial states (Bortoli et al., 2014, 2015, 2017). These results are in accordance with the aims of the national curriculum, which are emphasized in the PE teacher education (Italian Ministry of Education, University, and Research, 2009).

Based on this evidence, in the current study we focused on student perception of task-involving climate, basic psychological needs satisfaction, and pleasant/functional psychobiosocial states. In particular, we tested two alternative hypotheses through two mediation models. A first model (hypothesis 1) builds upon previous findings showing task-involving climate to be a significant positive predictor of (a) pleasant psychobiosocial states (Bortoli and Robazza, 2007) and (b) satisfaction of basic psychological needs (Bortoli et al., 2014). Therefore, we expected task-involving climate to predict individual intention to engage in physical activity directly and indirectly through the mediation of pleasant/functional psychobiosocial states and satisfaction of basic psychological needs (i.e. relatedness, competence, and autonomy). We conducted parallel mediation analysis (Figure 1, upper part), of the effects of task-involving climate on individual intention to engage in physical activity

directly as well as indirectly through pleasant/functional psychobiosocial states and satisfaction of basic psychological needs. In parallel mediation, no mediator causally influences another (Hayes, 2013).

[insert Figure 1.]

A second mediation model (hypothesis 2) was informed by the results of Bortoli et al.'s (2011) study involving adolescent athletes, in which actual and perceived competence interacted with motivational climate perceptions in the prediction of psychobiosocial states. Aligned with these results, the parallel mediation model was modified to include pleasant/functional psychobiosocial states as mediators of the relationship between psychological needs satisfaction and individual intention (Figure 1, lower part). Thus, a serial mediation model was conducted examining the effects of task-involving climate on individual intention to engage in physical activity, with a sequence in which psychological needs satisfaction were assumed to be predicted by task-involving climate, and then served as antecedents to psychobiosocial states, which in turn predicted individual intentions. In particular, we expected task-involving climate to predict the individual intention to engage in physical activity (a) directly and (b) through the serial mediation of competence and pleasant/functional psychobiosocial states.

Method

Participants and procedure

The study involved 478 students (final sample, 287 boys and 183 girls), aged 16-19 years (M = 17.4, SD = 1.3) from two high schools in Central Italy. During the academic year, participants were involved twice a week in mandatory PE classes (Italian Ministry of Education, University, and Research, 2009). The development of physical, emotional, and cognitive skills of students was a main goal according to the Italian PE curriculum. Based on this curriculum, PE activities were usually aimed to develop student postural control,

flexibility, endurance, speed, fitness, and agility. Tasks were individualized based on the students' ability level. Girls and boys were involved together in preparatory skills for acrobatic gymnastics, track and field, and team sports (e.g. basketball, volleyball, handball, and soccer), whereas competitive events took place separately. Teachers also provided students with information regarding physical fitness and living a healthy lifestyle.

Permission to conduct the study was obtained from the headteacher and four PE teachers (two women and two men, aged 48-55 years) after the general purpose of the study and procedures were explained. The students and their parents signed an informed consent form in accordance with the Declaration of Helsinki. Ethical approval for the study was gained from the university's ethics committee with anonymity and confidentiality being assured for all the participants. The assessments were conducted in groups of four or five students two months after the start of the academic year, without the presence of the teacher. Participants were assured confidentiality of individual results, and then asked to complete the questionnaires thinking about their current experience in PE classes. Emphasis was placed on the importance of being honest while responding the questionnaires. The entire assessment took approximately 20-30 minutes to complete.

Measures

Perceived motivational climate. Student perception of motivational climate was assessed using the Italian version of the Teacher-Initiated Motivational Climate in Physical Education Questionnaire (TIMCPEQ; Bortoli et al., 2008). The scale was comprised of 12 items measuring task- and ego-involving climates. In this study we used the task-involving climate subscale consisting of six items that measure student perception of teacher emphasis on skill mastery and effort (e.g. "the physical education teacher is most satisfied when every student learns something new"). Following the stem question "In this physical education class…" students assessed the typical environment as created by their PE teacher. Responses

were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Previous research has demonstrated acceptable internal consistency of the Italian version of the TIMCPEQ (i.e. Cronbach's $\alpha = .71$ for task-involving climate; Bortoli et al., 2008).

Psychological needs satisfaction. The Psychological Needs Satisfaction Scale in Physical Education (PNSSPE; Liu and Chung, 2014) comprised a 4-item subscale gauging autonomy (e.g. "I participate in PE classes based on my personal preference"), a 3-item subscale measuring competence (e.g. "I have the ability to perform well in my physical education classes"), and a 3-item subscale assessing relatedness (e.g. "I interact friendly with the people in my physical education classes"). The PNSSPE was adapted to Italian for the purpose of this study using the back-translation procedure. Responses were indicated on a 7-point scale ranging from 1 (*not at all*) to 7 (*very, very much*). Previous research has demonstrated adequate factor structure, CFI = .98, SRMR = .03, RMSEA (90% CI) = .06 (.05–.07), good internal consistency reliabilities, with composite reliability values ranging from .817 to .839, and good construct validity (Liu and Chung, 2014).

Psychobiosocial states. A 20-item questionnaire was developed in the PE context to assess pleasant/functional (10 items) and unpleasant/dysfunctional (10 items) psychobiosocial states in students (Bortoli et al., 2012) including emotional, cognitive, motivational, volitional, bodily, motor-behavioral, performance, and communicative modalities. Each item, representing a psychobiosocial state modality, included two or more descriptors of an emotional related experience (for more details, see Robazza et al., 2016). In this study, we used the pleasant/functional subscale comprised of 10 items. Examples of items assessing the affective modality are: "enthusiastic, confident, carefree, joyful". Examples of volitional components are: "purposeful, determined, persistent, decisive" (functional/pleasant state). Students were asked to rate each item on a 5-point scale ranging from 1 (*not at all*) to 5 (*very, very much*), while thinking of how they usually feel in their PE classes. Previous research

yielded acceptable results, GFI = .90, CFI = .93, RMR = .04, RMSEA (90% CI) = .07 (.06–.08), for a 2-factor structure of the 20-item inventory as administered in youth sport settings (Bortoli et al., 2012).

Intention to engage in physical activity or sport in leisure time. Dupont et al. (2009) administered the single item "PE makes me want to practice (continue to practice) a physical activity outside of school" to gauge student intention to engage in physical activity outside of school. We used the same item as a stem to measure five specific purposes associated with student intention to engage in physical activity. Specifically, students responded on a 5-point scale ranging from 1 (*not at all*) to 5 (*very, very much*) to "…to keep me fit", "…to practice sport in a club", "…to learn new skills", "…to practice different sports", and "…to keep me healthy".

Data analysis

Data were screened for missing data, potential outliers, and departures from normality (Tabachnick and Fidell, 2013). Mean scores were computed for each subscale, namely, perceived task-involving climate, relatedness, competence, and autonomy need satisfaction, and pleasant/functional psychobiosocial states. Descriptive statistics, Pearson product-moment correlation coefficients, Cronbach's alpha values, and composite reliability values of the latent variables were then computed. Multivariate analysis of variance (MANOVA) was executed to ascertain possible gender differences on the study variables. Stepwise regression analysis was conducted to determine which modality of psychobiosocial states predicted individual intention to engage in physical activity. This analysis was based on the expected positive relationship between psychobiosocial state modalities (i.e. emotional, cognitive, motivational, volitional, bodily, motor-behavioral, performance, and communicative) and individual intention to engage in physical activity (Bortoli et al., 2017).

Prior to conducting the main analysis, confirmatory factor analysis (CFA) was performed to examine the factorial validity of the measurement model using *M*plus version 7.31 (Muthén and Muthén, 2012). For both CFA and SEM we used the maximum likelihood (MLM) parameter estimator and a mean-adjusted chi-square test statistic, which is robust to non-normality (Byrne, 2012). According to commonly accepted suggestions (Hu and Bentler, 1999; MacCallum and Austin, 2000), acceptable fit is inferred when values for comparative fit index (CFI) and Tucker Lewis fit index (TLI) are close to .95, root mean square error of approximation (RMSEA) is smaller than .06, and standardized root mean square residual (SRMR) is smaller than .08. Furthermore, a χ^2/df value less than 5 indicates an acceptable model fit (Schumacker and Lomax, 2004).

We performed structural equation modeling (SEM) analyses to test two hypothesized models of expected relationships between perceptions of task-involving climate, psychological needs satisfaction, functional/pleasant and dysfunctional/unpleasant states, and intentions to engage in LTPA (Figure 1). The first hypothesized model (parallel mediation) tested the relationships between task-involving climate and intentions to engage in physical activity through needs satisfaction and psychobiosocial states. A second hypothesized model (serial mediation) tested the mediation of needs satisfaction, assumed to be predicted by task-involving climate, and acting as antecedent of psychobiosocial states, which in turn predicted individual intentions to engage in physical activity.

Results

Eight multivariate outliers were identified using Mahalanobis' distance criterion, and subsequently removed. There were no missing data. Thus, the final sample consisted of 470 participants. Descriptive statistics, Cronbach's alphas, composite reliabilities, and Pearson's correlation coefficients are presented in Table 1. As the table shows, students reported moderately high perception scores of task-involving climate, needs satisfaction,

pleasant/functional psychobiosocial states, and intention to engage in physical activity. Notably, mean scores of all variables were positively related to each other. A task-involving climate was positively correlated with the satisfaction of all needs, and autonomy in particular. All basic needs positively correlated with pleasant/functional psychobiosocial states. These results are consistent with the educational goals emphasized in school PE programs, and reflect the common attitude of physical educators to provide their students with a supportive and pleasant motivational climate (Italian Ministry of Education, University, and Research, 2009). Acceptable internal consistency scores (with alphas values > .78) and composite reliability values were found, suggesting reliability of the measures.

[insert Table 1.]

MANOVA by gender yielded significant results, Wilks' $\lambda = .824$, $F(6, 463) = 16.474$, $p < .001$, $\eta_p^2 = .176$. ANOVA univariate follow-up showed that boys reported significantly higher mean scores on all study variables compared to girls. Regression analysis results are contained in Table 2. The adjectives pertaining to motivational, bodily, volitional, and motor-behavioral modalities were significant predictors of individual intention to engage in physical activity.

[insert Table 2.]

CFA of the measurement model yielded acceptable fit indices for the hypothesized factor structure of the measures, $\chi^2/df = 2.129$, CFI = .932, TLI = .925, RMSEA (90% CI) = .049 (.045 – .053), SRMR = .054. Examination of the modification indices on task-involving climate, autonomy, and intentions to engage in physical activity suggested correlating two errors on each factor. Moreover, four errors were correlated on psychobiosocial states following suggestions based on modification indices. The fit of the measurement model including such re-specifications was further improved, $\chi^2/df = 1.95$, CFI = .944, TLI = .937, RMSEA (90% CI) = .045 (.040 – .050), SRMR = .051.

With regard to the structural models, gender was entered as a covariate in the analyses due to the significant gender differences on all variable scores emerging from MANOVA. SEM on the first model including parallel mediation (Figure 1, upper part) resulted in a barely acceptable fit, $\chi^2/df = 2.390$, CFI = .914, TLI = .904, RMSEA (90% CI) = .054 (.050 – .059), SRMR = .097. The second model including serial mediation (Figure 1, lower part) showed better fit with the data, $\chi^2/df = 1.970$, CFI = .941, TLI = .933, RMSEA (90% CI) = .045 (.041 – .050), SRMR = .051. As shown in Figure 2, the positive effect of task-involving climate on intention to engage in physical activity was partially mediated by the competence and pleasant/functional psychobiosocial states sequence, with all paths significant at $p < .001$.

[insert Figure 2.]

Discussion

The aim of this study was to examine the impact of a task-involving motivational climate, needs satisfaction, and pleasant/functional psychobiosocial states on student intention to engage in LTPA. Our study extends past research on motivational climate and related emotional responses typically limited to the study of enjoyment, fun, satisfaction, anxiety, and boredom.

Findings showed that a task-involving climate had significant direct and indirect effects on students' intention to engage in physical activity in their leisure time. A recent review of sport and physical activity studies confirmed task-involving climate to be consistently associated with many adaptive motivational outcomes, such as perceived competence, self-esteem, intrinsic forms of motivation, pleasant affective states, and moral attitudes (Harwood et al., 2015). In a number of IZOF-related studies in PE, a task-involving climate was associated with pleasant/functional psychobiosocial states (Bortoli et al., 2014, 2015, 2017; Bortoli and Robazza, 2007). Aligned with previous research findings (Escartí and Gutiérrez, 2001; Sproule et al., 2007), our results indicated a direct effect of task-involving

motivational climate also on student intention to engage in LTPA. This suggests that a task-involving climate might be an important environmental motivational factor in the promotion of an active lifestyle.

The present study also provided clear support for the positive role of competence need satisfaction in determining intention to engage in LTPA in high school students. Indeed, the serial mediation results indicated task-involving climate to predict competence need satisfaction. This basic psychological need then served as antecedent to pleasant/functional states, which in turn predicted individual intention to engage in physical activity (hypothesis 2). Interestingly, regression analysis showed motivational/volitional psychological modalities and bodily/motor-behavioral biological modalities, as conceptualized in the IZOF model (Hanin, 2010), to be predictive of individual intention to engage in LTPA. These findings highlighted the distinctive information and contribution deriving from the assessment of emotion and emotion-related psychobiosocial states in the PE context.

Of note, while no significant results were found for autonomy and relatedness, competence need satisfaction showed a significant influence on the intention to engage in LTPA. According to several theoretical approaches in the study of motivational processes (e.g. Bandura, 1997; Deci and Ryan, 2000; Harter, 2012; Nicholls, 1984), competence is reflected in almost all aspects of life as a general desire to feel effective in the interactions with the environment (Conroy et al., 2007). Numerous AGT studies in physical activity and in PE settings have shown task-involving climate and perceived competence to be positively related (e.g. González-Cutre et al., 2009; for a review, see Ntoumanis and Biddle, 1999). Papaioannou et al. (2006) found that perceived athletic competence both at the beginning and at the end of the academic year predicted sport and exercise participation seven and 14 months later. These authors suggested that high perceptions of competence facilitate positive expectations for achievement behaviors, such as persistence, choice of challenging tasks, and

high effort. Similarly, SDT proponents contend that individual level of intrinsic motivation toward a particular activity vary as a function of perceived competence on that activity (see Ryan and Deci, 2017). In PE settings, Ntoumanis (2001) found perceived competence to be a strong predictor of self-determined motivation, while Taylor et al. (2010) showed higher levels of competence need satisfaction to be related to more effort and higher intention to engage in LTPA. In a sample of high school students, Hein et al. (2004) also found two dimensions of self-determined motivation in PE (i.e. intrinsic motivation to experience stimulation and intrinsic motivation to accomplish) to be significant predictors of the intention of being physically active after graduation. Aligned with the findings of previous studies, competence need satisfaction in our investigation was found significantly related to pleasant/functional psychobiosocial states and intention to engage in LTPA. According to Elliot et al. (2017), "…competence motivation is broadly and deeply applicable to psychological functioning: It is ubiquitous in everyday life, it has an important influence on emotion and well-being, it is operative and integral throughout the lifespan, and it is relevant to individuals across cultures." (p. 3)

Together with competence need satisfaction, our results highlighted the important role of pleasant/functional psychobiosocial states in the relationship between a teacher-created task-involving climate and individual intention to engage in physical activity. Our results, indeed, supported a serial mediation model in which task-involving climate predicted the individual intention to engage in physical activity both directly and through the mediation of competence need satisfaction and pleasant/functional psychobiosocial states. Findings concur with the recent growing interest in the study of emotions in educational settings. Linnenbrink-Garcia and Pekrun (2014) consider the classroom as an emotional place and teachers responsible not only for imparting knowledge, but also for inspiring passion for the discipline and excitement about learning experiences. Within the broad debate on the value of PE and

related curriculum objectives, beside instrumental or developmental goals (e.g. skills learning, health, social responsibility/equity, and leadership), many sport pedagogues and physical educators argue for movement and play pleasure as the prime intrinsic value (Devine and Telfer, 2013; see Pringle, 2010, for a review). However, a crucial role has been ascribed nowadays to PE in preventing chronic disease and improving health (Sallis et al., 2012). Providing motivating and enjoyable experiences that facilitate student participation in physical activity at school and outside of school has become a goal of outmost relevance. Previous studies have shown pleasant emotions in PE, such as enjoyment and fun, to be important psychosocial variables linked with increased participation in physical activity (Jaakkola et al., 2017; Yli-Piipari et al., 2012, 2013). Bengoechea et al. (2010) suggested that pleasant emotional states in PE may have a protective effect against situations that place adolescents at risk of becoming physically inactive. Fredrickson (2001) proposed that pleasant emotions predict positive outcomes because these emotions help individuals build enduring physical, psychological, and social resources, with long-term adaptive benefits.

From an applied perspective, our findings provide some insight into how PE teachers could foster student intention to engage in physical activity outside of school. They should carefully consider the way they structure and conduct lessons, because adopting a task-involving climate, strengthening perceived competence, and favoring pleasant emotional states may lead to enhanced student motivation and intention to be more active in leisure time. Previous research findings showed that a clear-cut task-involving climate intervention influenced student climate perceptions, even overriding the individual dispositional goal orientation, and had different behavioral, emotional, and cognitive consequences (Barkoukis et al., 2008; Bortoli et al., 2015, 2017; Weigand and Burton, 2002). A useful basis to promote a task-involving climate in classroom settings is the TARGET model (Ames, 1992; see Braithwaite et al., 2011, for a meta-analysis). Competence perception also plays a central role

in PE, and the satisfaction of the need for competence can lead to positive motivational consequences. For instance, the emphasis that PE teachers place on individual improvement criteria is an important social factor that may result in student competence need satisfaction (Ntoumanis, 2001). In response to student performance, teachers should provide motivational and informational feedback, containing positive statements about effort, reference to personally relevant goals, and information about competence. Feedback that contains competence information is likely to have a relevant effect on competence need satisfaction and motivation (Hein and Koka, 2007). A task-involving climate and competence need satisfaction are expected to nurture pleasant/functional emotion-related states in PE and foster student intention to engage in LTPA.

Limitations and future directions

The present study has some limitations that should be addressed in future research. The first limitation is related to the fact that we did not examine possible mediation effects of behavioral regulations, which according to SDT (Deci and Ryan, 2000) lie on the continuum from intrinsic to extrinsic motivation. A number of studies applying the SDT framework, indeed, found that the relationship between psychological need satisfaction and adaptive outcomes was mediated by motivational regulations, reflecting varying levels of self-determined motivation (e.g. Standage et al., 2003). The cross-sectional nature of the study is an additional limitation that precludes inferences about long-lasting effects of motivational climate, psychological needs satisfaction, and psychobiosocial states on the individual intention to engage in physical activity. Thus, future research employing longitudinal or experimental designs should investigate long-term effects, as well as the extent to which student intention to engage in LTPA is predictive of actual practice and translates into stable behavior.

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Table 1

Descriptive Statistics, Pearson Correlation Coefficients, Alpha Coefficients, and Composite Reliability Values (N = 470)

	Boys		Girls							
Measure	*M*	*SD*	*M*	*SD*	1	2	3	4	5	6
1. Task-involving climate	3.51	0.78	3.28	0.80	(.87, .88)					
2. Relatedness need satisfaction	5.73	1.12	5.21	1.15	.24	(.86, .86)				
3. Competence need satisfaction	5.09	1.17	4.28	1.30	.28	.54	(.85, .86)			
4. Autonomy need satisfaction	4.47	1.39	3.41	1.49	.56	.34	.44	(.87, .87)		
5. Pleasant/functional psychobiosocial states	3.27	0.69	2.78	0.73	.43	.43	.69	.48	(.90, .90)	
6. Intention to engage in physical activity	2.93	1.00	2.72	0.95	.39	.28	.46	.34	.53	(.78, .79)

Note. Alpha coefficients and composite reliability values are in parenthesis on the diagonal. All correlations are significant at $p < .01$.

Table 2

Psychobiosocial States as Predictors of Intention to Engage in Physical Activity

Psychobiosocial States (Modality)	β	R^2	R^2 change	F change	F sig. change
Motivated, committed, inspired (motivational)	.186	.206	.195	114.889	.001
Vigorous, energetic, physically-charged (bodily)	.207	.264	.057	36.223	.001
Purposeful, determined, persistent, decisive (volitional)	.159	.283	.019	12.498	.001
Relaxed-, coordinated-, powerful-, effortless-movement (motor-behavioral)	.137	.295	.012	7.966	.005

Note. Gender was entered as a covariate in the analysis.

Figure captions

Figure 1.

Hypothesized models of mediation effects of the interrelationships between task-involving climate, psychological needs satisfaction (i.e. relatedness, competence, and autonomy), pleasant/functional psychobiosocial states, and intentions to engage in physical activity. Model 1 depicts a parallel mediation model of the indirect effects of task-involving climate on intention to engage in physical activity through relatedness, competence, autonomy, and psychobiosocial states. Model 2 portrays a serial mediation model of the indirect effects of task-involving climate on intention to engage in physical activity through relatedness, competence, autonomy, and psychobiosocial states.

Figure 2.

Serial mediation model of the effects of task-involving climate on intention to engage in physical activity through relatedness, competence, autonomy, and pleasant/functional psychobiosocial states. Standardized factor loadings derived from structure equation modeling, with gender entered as a covariate in the analysis. Item indicators (loadings were > .40) are not included for simplicity. All paths are standardized and significant at $p < .001$ (two-tailed). Nonsignificant paths are omitted.