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Relationships among perceived motivational climate, motivational regulations, enjoyment, and PA participation among Finnish physical education students

Abstract

The influence of teacher-initiated motivational climate on cognitive, affective, and behavioural student outcomes has been highlighted as an area of future research. This study, grounded in Self-Determination and Achievement Goal Theories, examined how teacher-initiated motivational climate can increase student motivation and positive affective responses in physical education along with their physical activity participation, and whether motivational climate has a longitudinal effect across middle school. In addition, we aimed to examine the role of positive affect in explaining the relationship between motivation in physical education and out-of-school physical activity participation. A sample comprised 540 adolescents (277 boys, 263 girls, median age 13) and they responded to self-report questionnaires measuring their perception of motivational climate in PE classes (Motivation Climate in Physical Education Questionnaire), self-determined motivation (Physical Education Motivation Scale), enjoyment (Sport Enjoyment Scale), and physical activity (Health Behaviour in School-aged Children Research Protocol) twice at both Grade 7 and 9. Structural equation model analyses produced three main findings. First, the study showed that intrinsic motivation was the vital component of motivation that transferred the effect of learning-oriented climate to long-lasting enjoyment in PE context. Second, although performance-oriented climate did not have a direct effect on enjoyment, performance-oriented climate had a long-lasting effect on non-self-determined motivation. Finally, the study showed enjoyable experiences in PE to transfer intrinsic motivation into PA participation. The findings of the study extend our understanding on how teacher-initiated motivational climate in PE can lead to increase PA participation during middle school.

Keywords Self-determined motivation, motivational climate, enjoyment, physical activity

Physical inactivity has been one of the leading determinants to double the worldwide prevalence of obesity since 1980 (World Health Organization, 2013). It has been argued that schools and physical education (PE) are the most cost-effective channels to affect public health because of schools' potential to reach the whole age cohort of children and adolescents (Sallis et al., 2012). However, due to limited amount of weekly PE classes, physical educators' resources to engage their students in recommended daily 60 minutes of moderate-to-vigorous PA (U.S. Department of Health and Human Services, 2008) are inadequate. Thus, the examination of the pathways through which motivational and positive PE experiences transfer into physically active lifestyle is well warranted. In addition, the examination of the role of motivational climate in children and adolescent PA has been suggested as one of the top ten research questions in PE domain (Chen, 2013). Thus, evolving from the current state of affairs and grounded in self-determination (SDT; Deci & Ryan, 1985) and achievement goal (AGT; Nicholls, 1989) theories, the purpose of the current study was two-fold. First, we aimed to examine how teacher-initiated motivational climate can influence student motivation and affect in PE along with their PA participation, and whether motivational climate has a longitudinal effect across middle school. Second, we aimed to examine the role of positive affect in explaining the relationship between motivation in PE and out-of-school PA participation.

Self-Determination Theory

SDT is a prominent theory used to understand human motivation in PA settings. The theory offers an explanatory framework for the understanding of the quality of motivation behind volitional and satisfying behaviours (Deci & Ryan, 1985, 2000; Deci, Ryan & Guay, 2013). SDT identifies three major types of motivation existing in any life context; intrinsic motivation, extrinsic motivation and amotivation[1] (Deci & Ryan, 2000). Intrinsic motivation represents engagement in an activity for the pleasure and excitement, whereas extrinsic

motivation has been typically divided into three motivational regulations corresponding to different levels of self-determination (Deci & Ryan, 2000). In the most self-determined regulation, which is labelled identified regulation, participation in the activity is a result of the individual's choice as he/she acknowledges the value and importance of the activity for the self. Introjected regulation describes behaviours which have been only slightly internalized and which are performed out of feelings of guilt or shame. The least self-determined regulation of extrinsic motivation is external regulation which describes involvement in an activity due to external demands and contingencies, such as obtaining rewards, avoid punishment or due to external pressure. In addition, amotivation, which reflects a lack of either intrinsic or extrinsic motivation, is a construct similar to learned helplessness and it corresponds to an absence of reasoning and intention to carry out behaviour (Deci & Ryan, 1985, 2012).

Students who participate in PE due to the most self-determined (autonomous; intrinsic motivation and identified regulation) reasons are considered autonomously motivated in PE in contrast to students who participate due to non-self-determined (controlled; introjected regulation, external regulation) reasons. SDT has been extensively studied in PE and evidence has consistently showed that self-determined motivation is associated with positive cognitive (e.g., concentration), affective (e.g., enjoyment) and behavioural (e.g., effort, PA) responses during lesson participation as compared to controlled motivation (see Vallerand, 1997, 2007).

Achievement Goal Theory (AGT)

AGT is a theoretical approach that has been used to understand the students' behaviour in PE (Roberts, 2012). The focal tenet of AGT is that there are two conceptions of defining competence and success in activity, namely learning and performance orientation[2] (Nicholls, 1989; Roberts, 2012). Learning orientation corresponds in attributing success to

self-referenced criteria, such as effort. The focus of activity involvement is mastering the tasks at hand and improvement. Performance-oriented individuals ascribe success to other-reference criteria such as ability, and the main objective of engagement in an activity is to demonstrate competence and outperform others (Nicholls, 1989; Roberts, 2012).

These two conceptions of competence and success have been also used to describe the situational goal structure, namely perceived motivational climate, which reflects people's perceptions of the emphasis placed by social agents on developing (i.e., learning-oriented climate) or demonstrating competence (i.e., performance-oriented climate; Ames, 1992). According to AGT perceptions of learning-oriented climate promotes mastery of skills and personal improvement and perceptions of performance-oriented climate advances social comparison and focuses on obtaining performance attainments (Duda & Balaguer, 2007).

Perceptions of learning-oriented climate, as postulated in AGT, result in positive consequences as compared to perceptions of a performance-oriented climate (Braithwaite, Spray, & Warburton, 2011). Empirical evidence has shown that learning-oriented climate relates positively to enjoyment (Barkoukis, Ntoumanis, & Thogersen-Ntoumani, 2010; Liukkonen, Barkoukis, Jaakkola, & Watt, 2010) and out-of-school PA participation (Barkoukis & Hagger, 2013), whereas research evidence has indicated that perceptions of performance-oriented climate display a neutral or negative effect on these outcomes (Barkoukis & Hagger, 2013). Studies have also demonstrated that learning-oriented climate is positively associated with self-determined motivation (Ommundsen & Kvalo, 2007; Standage, Duda, & Ntoumanis, 2003). In the same studies performance-oriented climate has been found to be unrelated or negatively related with self-determined motivation but insignificantly associated with amotivation (Ommundsen & Kvalo, 2007; Standage et al., 2003).

Enjoyment

Based on the conceptualization of Scanlan and Simons (1992), we operationalized enjoyment as a positive affective response to a certain activity that corresponds to states experienced during PE participation and described as “enjoy,” “happy,” “like,” and “fun.” In this sense, enjoyment differs from the SDT postulated intrinsic motivation and it should be viewed as a broader and more inclusive construct (Fairclough, 2003; Scanlan & Lewthwaite, 1986). Whereas intrinsic motivation refers to internal locus of causality in participation (participation is due to totally intrinsic reasons, such as stimulation, pleasure, excitement), enjoyment corresponds to experienced affective outcome of the participation (enjoyment, happiness).

Previous studies have shown that students’ perceptions of learning-oriented climate have a direct positive association with PE enjoyment (perceptions of performance-oriented climate have a negative relation) (Barkoukis, Hagger, Lambropoulos & Tsorbatzoudis, 2010). In addition, students’ enjoyment in PE has been found to be an important affective variable linked with increased PA (Garcia Bengoechea, Sabiston, Ahmed, & Farnous, 2010; Papaioannou, Bebetsos, Theodorakis, Christodoulidis, & Kouli, 2006; Wang, Chatzisarantis, Spray, & Biddle, 2002) and it has been found to mediate the effectiveness of a school-based PA intervention (Dishman et al., 2005). In fact, previous studies have suggested enjoyment in PE to be a missing link between motivation in school PE and PA (e.g., Wallhead & Buckworth, 2004). The basic premise of this assumption is that if school PE increases students’ positive affect, such as enjoyment, these affective outcomes will transfer into motivation to adopt a physically active lifestyle in other contexts (Wallhead & Buckworth, 2004). This assumption is based on theory and empirical findings suggesting that the experience of enjoyment is a critical factor in determining one’s motivation for and continued participation in exercise settings (Kremer, Trew, & Ogle, 1997).

The Present Study

The general purpose of the study was to examine how students' perception of teacher-initiated motivational climate can increase students' self-determined motivation and enjoyment in PE along with their PA participation. This study tested Vallerand's (2007; see also Deci & Ryan, 2012) model in which self-determined motivation is hypothesized to mediate the relationship between students' perception of social environment (learning-oriented climate should have a positive relationship; performance-oriented climate should have a negative relationship) and enjoyment. Empirical evidence has partly supported this postulation, showing a positive relationship between PE students' perceptions of learning-oriented climate, enjoyment, and PA participation whereas the relationship between performance-oriented climate and the outcomes has been mixed (Barkoukis & Hagger, 2013). A systematic review of SDT-related studies in exercise and PA domains (Teixeira, Carraça, Markland, Silva, & Ryan, 2012) concluded that both self-determined and non-self-determined motivation can lead to positive outcomes in exercise participation, but only self-determined motivation leads to long-term exercise participation and maintenance because it is more rewarding and enjoyable. In addition, by applying a longitudinal cross-lagged approach we were able to test the whether learning-oriented climate and self-determined motivation in comparison to performance-oriented climate and non-self-determined motivation have a more lasting effect on PA across middle school years. By applying a longitudinal approach, we are able to take into account such processes as they unfold during middle school years, as well as to estimate relations taking into account the temporal ordering of these processes, an important prerequisite to causality.

Second, to enhance adolescents participation in daily 60 minutes of moderate-to-vigorous PA (U.S. Department of Health and Human Services, 2008), the examination of pathways through which positive motivational and affective experiences in PE transfer into increased out-of-school PA have gained continued interest (Chen, 2013). Although learning-

oriented PE climate, self-determined motivation, and enjoyment have found to be related positively to PA (Braithwaite et al., 2011), there is a lack of studies examining the pathways through which teacher-initiated motivational climate in PE can impact students' PA participation. It is important to recognize that PE motivation and overall PA motivation are conceptually different hence they occur in different contexts. In other words, a student may have high PE motivation but low motivation to be physically active during leisure-time. Thus, this study was to examine the argument suggesting that PE enjoyment is a "missing link" to explain the transfer of PE motivation on PA participation (Wallhead & Buckworth, 2004). The present study views PE enjoyment as a possible mediator of the effect of motivational climate and motivational regulations in PE on PA participation.

We tested the following research hypotheses. H_{1a}: We hypothesized that perceptions of learning-oriented climate relates to higher self-determined motivation, lower amotivation, higher enjoyment, and higher PA participation across both grade levels (Barkoukis & Hagger, 2013; Standage et al., 2003). In contrast, perceived performance-oriented climate was assumed to relate to maladaptive pattern, such as higher non-self-determined motivation, amotivation and lower enjoyment and lower levels of PA. H_{1b}: We hypothesized that learning-oriented climate at Grade 7 predicts, not only learning-oriented climate but also self-determined motivation at Grade 9; In contrast, we hypothesized that performance-oriented climate at Grade 7 predicts, not only performance-oriented climate but also non-self-determined motivation at Grade 9 (Barkoukis & Hagger, 2013). H_2: We hypothesized that enjoyment is a significant mediator between self-determined motivation in PE and PA. Specifically, we hypothesized that enjoyment mediates between motivation in PE and PA, self-determined motivation relating to higher PE enjoyment and PA (Wallhead & Buckworth, 2004).

Method

Participants

A total of 540 adolescents (277 boys, 263 girls; 95% Caucasian) enrolled in five urban middle schools were examined during Grade 7 (7^{th} grade fall) and Grade 9 (9^{th} grade fall). At the beginning of the study, the median age of the students was 13 (age range from 12 to 14). All but nine students were enrolled in the same school and under the same PE teacher across Grades 7 to 9. The study comprised nine Caucasian PE teachers (M_{age} 45.3[7.18]), with an average of 18 years of teaching experience. There were no remarkable differences in PE facilities and equipment between study schools. The research protocol was approved by the ethical committee of the local university. Children and teachers were recruited through a direct contact with schools in consultation with the school principal. All the middle school children were invited to participate and parental consents and child assents were obtained. Participation was completely voluntary and participants had the right to withdraw from the study at any time. All the measurements were carried out by a trained team of researchers and took place during PE lessons.

Research Context

This study was conducted in Finland, the northernmost country of the European Union. PE is mandated as a part of the Finland's comprehensive school curriculum (detailed description of the Finland's PE curriculum can be found in Yli-Piipari, in press). The Finnish National Board of Education designs the core curriculum goals and content for physical education at all school levels. Health is a critical aspect of the Finnish PE curriculum supported by continuing attention to the skills and knowledge associated with lifelong engagement in physical activity. Additionally, Finnish PE aims are more related to cooperation, socialization, and team effort than physiology, competitions, and results. In middle school (grades 7 to 9), students are taught by a specialist (5-year master degree in PE pedagogy) PE teacher and they have seven obligatory PE units (a unit is 38 hours), that is two

or three 45-minute PE lessons weekly. In addition, students have a possibility to select a maximum of three PE units from a set of elective units that are developed according to the local school curriculum. In Finland, PE is typically organized around multi-activity programs in a series of units (Heikinaro-Johansson & Telama, 2005) and it has been found to be similar to that in other Western countries (Annerstedt, 2008) and in the U.S. (Yli-Piipari, in press).

Measures

A pilot study (*N*= 230) to test reliability and validity of the scales and to reduce the number of factor indicators was conducted prior to the present study. A detailed description of the pilot study can be provided by a first author on request. To avoid survey fatigue, the number of factor indicators of the original scales was reduced (task climate 6 -> 4; ego climate 6 -> 4; intrinsic motivation 12 -> 9; and identified, introjected, external regulation, and amotivation 4 -> 3).

Motivational climate. Perceptions of motivational climate in PE was measured using the Finnish version of Motivation Climate in Physical Education Questionnaire (MCPEQ; Soini, Liukkonen, Watt, Yli-Piipari, & Jaakkola, 2014), which consists of two subscales representing learning- and performance-oriented climate. The individual item stem used in the measure was "*In my PE class...*". Both the learning-oriented dimension (e.g. "*It is important for students to try their best in PE lessons*"), and the performance-oriented (e.g. "*It is important for students to succeed better than others in PE lessons*") dimensions consisted of four items. Responses were indicated on a five-point Likert-scale ranging from strongly disagree (1) to strongly agree (5). Factorial validity and internal consistency of the MCPEQ have found to be satisfactory (Soini et al., 2014).

Motivation. Contextual PE motivation along with a lack of motivation (amotivation) was assessed with the Finnish version of the Physical Education Motivation Scale (PEMS; Jaakkola, 2002), which is a modified version of the Sport Motivation Scale (Pelletier et al.,

1995). The Physical Education Motivation Scale consists of five subscales comprising nine items of intrinsic motivation and three items of identified, introjected, and external regulation, and amotivation. Each item was rated on a five-point Likert scale (1 = *does not correspond at all…* 5 = *corresponds exactly*). T he scale used in this study had the individual item stem, "*I'm currently participating in physical education, because…*". Construct validity and internal consistency of the PEMS have been found to be satisfactory (Jaakkola 2002).

Enjoyment. The Finnish version of the Sport Enjoyment Scale (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) was used to assess enjoyment in PE lessons (Soini et al., 2007). The scale measures one dimension of enjoyment with four items. The items of the original version were modified to measure enjoyment during PE lessons (example item, "*I have fun during PE lessons*"). Participants responded on a five-point Likert scale with a range from 1 (*not at all*) to 5 (*very much*). Construct validity and internal consistency of the Sport Enjoyment Scale have found to be satisfactory (Soini, Liukkonen, Jaakkola, Leskinen, & Rantanen, 2007).

Physical activity. To assess adolescents' self-report PA, the Health Behavior in School-aged Children Research Protocol was used (Currie, Samdal, Boyce, & Smith, 2002). The scale was to measure on how many days in the week students are meeting a 60-minute moderate-to-vigorous PA recommendation (U.S. Department of Health and Human Services, 2008). The scale consisted of two items and was rated on an eight-point response scale (0 - 7 days of the week). The introduction for the scale was: "*In the next two questions PA means all activities which raise your heart rate or momentarily gets you out of breath, for ex-ample, in doing exercise, playing with your friends, going to school, or in school PE. PA also includes for example jogging, intensive walking, roller skating, cycling, dancing, skating, skiing, soccer, basketball and baseball."* The items were: (a)"*Think about your typical week. How many days did you exercise for at least 60 min. during which you got out of breath" and*

(b) "Think about your last 7 days. How many days did you exercise for at least 60 min during which you get out of breath?" A sum scale of PA engagement was formulated by adding the response scores for the two items to assess students' self-report engagement in moderate-to-vigorous PA. Prochaska, Sallis and Long (2001) reported adequate factorial validity and reliability of these two PA engagement within adolescence population.

Statistical Analyses

Preliminary analyses were initiated by calculating descriptive statistics, such as means, standard deviations, and Pearson's correlation coefficients of the research variables. Missing data comprised 1.7% of all cases and were handled under the assumption that the data were missing at random (Collins, Schafer, & Kam, 2001). To test the hypothesis H_{1a}, a structural equation model (SEM) was conducted separately for Grades 7 (T0) and 9 (T1). A SEM encompasses two components: a measurement model (essentially the confirmatory factor analysis; CFA) and a structural model. A measurement model is a multivariate regression model that describes the relationship between a set of observed (factor indicators) and latent (factors) variables. A structural model allows the simultaneous estimation of several dependent latent constructs. To test the hypothesis H_{1b}, Time 1 variables were regressed by estimating regressions coefficients from the subsequent Time 0 variables (i.e., PA T0 to PA T1). In addition, cross-lagged paths from the most proximal and theory-supported determinants (T0) to outcome variables (T1) were estimated [paths from learning- and performance-oriented climate (T0) to intrinsic, identified, introjected, and extrinsic regulations and amotivation (T1); from intrinsic, identified, introjected, and extrinsic regulations along with amotivation (T0) to enjoyment (T1); from enjoyment (T0) to PA (T1)]. To test the second hypothesis (H_2), the role of enjoyment as a possible mediator was tested by using the MODEL INDIRECT command.

All analyses were performed using the Mplus statistical package (Version 6.1; Muthén & Muthén, 1998–2013). A COMPLEX option was used to correct a possible nonindependence of the observations based on students being nested within their PE classes (Asparouhov, 2005). A SEM fits the data well when the *p* value associated with the chi-square test is non-significant. Additionally, if the values of the Bentler comparative fit index (CFI) and Tucker-Lewis index (TLI) are above .95 and the values of the Root Mean Squared Error of Approximation (RMSEA) are below .06, a good fit between the hypothesized model and the observed data exists (Hu & Bentler, 1999). To determine the statistical significance of possible mediation or indirect effects, bootstrapped asymmetric confidence intervals were calculated based on 5,000 bootstrapped samples (i.e., Hayes, 2009). A mediation or indirect effect is supported if the confidence interval (CI) does not contain 0, which suggests that the independent variable significantly influences the mediator, which in turn influences the dependent variable.

Results

Preliminary Analyses

Table 1 presents Pearson's correlation coefficients, means, standard deviations, Cronbach's alphas, and the values of the Pearson's first coefficient of skewness for all the variables studied. Cronbach's alpha values showed acceptable internal consistency of the scales ($\alpha > .70$) and Pearson's first coefficient of skewness indicated that a distribution of the data were in acceptable limits. Perceptions of learning-oriented climate had a moderate-to-strong correlation with self-determined motivation and enjoyment, a weak-to-moderate correlation with controlled motivation and participation in PA, and a negative correlation with amotivation. In addition, perceptions of performance-oriented climate had a positive and weak-to-moderate correlation with self-determined motivation and a moderate correlation with controlled motivation and amotivation, and no relation with enjoyment and participation

in PA. Enjoyment in PE had a positive and moderate relationship with participation in PA. Finally, a Bonferroni-corrected paired *t* test showed adolescents' perception of learning-oriented climate ($t(515) = 6.97$, $p < .001$), PE enjoyment ($t(529) = 4.74$, $p < .001$), and participation in PA ($t(520) = 3.47$, $p < .001$) to decline, while extrinsic regulation ($t(529) = 4.73$, $p < .001$) and amotivation ($t(528) = 4.16$, $p < .001$) increased.

Structural Equation Models

A SEM was conducted to test the hypothesis 1a *separately* at Grade 7 and 9 (Figure 1). The fit indices showed that the model that included all factor indicators and structural pathways from perceptions of learning and performance-oriented climates via the different dimensions of self-determined motivation to enjoyment and PA fitted the data acceptably across both time points: Model T0 $\chi2(528) = 803.013$, $p < .001$, CFI = .95, TLI = .94, and RMSEA = .052 , 90% CI[.05, .07]; Model T1 $\chi2(528) = 782.778$, $p < .001$, CFI = .95, TLI = .94, and RMSEA = .054 , 90% CI[.05, .07]. However, the residual variance of the latent intrinsic motivation factors for both models was negative. Inspection of modification indices showed that both models would be improved if an alternative path from perception of learning-oriented climate directly to enjoyment was estimated. This modification is empirically justified, considering that learning-oriented climate has found to be related directly to both self-determined motivation and to enjoyment (Braithwaite et al., 2011). The data fitted new models acceptably: Model T0 $\chi2(527) = 779.054$, $p < .001$, CFI = .96, TLI = .95, and RMSEA = .049 , 90% CI[.046, .053]; Model T1 $\chi2(527) = 752.917$, $p < .001$, CFI = .96, TLI = .95, and RMSEA = .047 , 90% CI[.044, .051]. Table 2 presents fit indices and all factor loadings of the final models.

Table 3 presents the results of the regressions analyses. The analyses showed that perceptions of learning-oriented climate positively related to self-determined motivation (T0: $\beta int = .65$, $\beta id = .56$; T1: $\beta int = .63$, $\beta id = .45$) and non-self-determined motivation (T0: $\beta intr$

= .44, βex = .38; T1: βintr = .50), and negatively to amotivation (T0: βam = -.36; T1: βam = -.28). Self-determined motivation associated positively with enjoyment (T0: int -> enj β = .28, id -> enj β = .48; T1: β = .32), whereas non-self-determined did not. On the contrary, perceptions of performance-oriented climate positively related to non-self-determined motivation (T0: βintro = .20, βex = .37; T1: βintr = .27; βex = .49) and amotivation (T0: βam = .28; T1: βam = .28). In addition, amotivation was negatively associated with enjoyment (T0: βenj = -.23; T1: β = -.32), enjoyment related positively to PA (T0: βpa= .38; T1: β= .31), and intrinsic motivation had positive but indirect relationship with PA via enjoyment (β= .18). The sizes of the effects were weak to strong explaining the 10% to 70% of the variances of the dependent variables: R^2: intrinsic motivation = .45(.05)/.47(.06); identified regulation = .33(.06)/32(.05); introjected regulation = .26(.05)/.41(.05); external regulation = .26(.05)/.27(.05); amotivation = .18(.04)/.15(.04); enjoyment = .64(.05)/.70(.05); PA = .15(.03)/10(.03) (presented as T0/T1)[the standard errors are presented in the parentheses].

To test the hypothesis 1b, regressions coefficients from T0 variables to T1 variables were implemented to test possible longitudinal effects between research variables. The fit of this model was acceptable: $\chi2(1403) = 23128.809$, $p < .001$, CFI = .95, TLI = .95, RMSEA = .031, 90% CI[.028, .034]. Similarly to the previously estimated cross-sectional models, the residual variance of the latent intrinsic motivation factor was negative. Therefore, additional direct paths from learning-oriented climate to enjoyment (both T0 and T1) were estimated. The new model fit was acceptable: $\chi2(1400) = 2099.257$, $p < .001$, CFI = .95, TLI = .95, RMSEA = .030, 90% CI[.028, .033]. The results of the significant relationships are presented in the Table 4. The results showed that students' perceptions of their motivational climate, motivational regulations, amotivation, enjoyment, and PA participation were relatively stable across time standardized regression coefficients ranging from .28 to 46. In addition, only

performance-oriented climate had a cross-lagged effect predicting future introjected regulation (β = .18), extrinsic motivation (β = .24), and amotivation (β = .17).

To test the second hypothesis, the possible mediating role of enjoyment was examined based on 5,000 bootstrapped samples. The study showed a statistically significant indirect relationship from learning-oriented PE climate via PE enjoyment to PA participation in both 7th (95% asymmetric CI ranged from .01 to .37) and 9th (95% asymmetric CI ranged from .02 to .17) grades (Table 5). In addition, a longitudinal indirect relationship from enjoyment at T0 via enjoyment at T1 to PA at T1 was established (95% asymmetric CI ranged from .06 to .21). Considering the found direct relationship between learning-oriented climate and enjoyment, we expanded our analyses and investigated the possible mediating role of intrinsic motivation. The study showed that intrinsic motivation in PE mediated the relationships between learning-oriented PE climate and enjoyment in both 7th (95% asymmetric CI ranged from .04 to .53) and 9th (95% asymmetric CI ranged from .09 to .32) grades (Table 5). Furthermore, a longitudinal indirect relationship from learning-oriented climate at T0 to enjoyment at T1 via intrinsic motivation at T1 (95% asymmetric CI ranged from .02 to .15) and learning-oriented climate at T0 to enjoyment at T1 via enjoyment at T0 (95% asymmetric CI ranged from .09 to .25) emerged.

Discussion

The aim of the study was to analyse how teacher-initiated motivational climate in PE influenced students' motivation and affective responses in PE along with their PA participation, and whether these relationships were sustainable across middle school levels 7 to 9. In addition, we aimed to examine the role of positive affect in explaining the relationship between motivation in PE and PA participation. This study extended our understanding on the effects of learning- and performance-oriented climate on PE enjoyment

and PA participation. In addition, the role of positive affect, such as enjoyment in PE, as an indirect mediator between motivational experiences in PE and overall PA participation.

Effect of Learning-Oriented Climate

Our findings partially supported our hypothesis (H_{1a}) and the findings of the previous studies that have shown learning-oriented climate to relate to adaptive motivational consequences (Barkoukis et al., 2010; Barkoukis & Hagger, 2013). Our results showed that students who perceived their climate highly learning-oriented were more self-determined in PE, enjoyed PE more, and had lower amotivation compared to students who perceived their climate as less learning-oriented. These findings are consistent with AGT theory and empirical evidence (Ames, 1992) and indicate that practices that contribute to learning-oriented PE climate, such as variety of tasks, enhanced cooperation, autonomy support, provision of self-referenced feedback, self-evaluation can result into adaptive responses during PE lessons. Importantly, this process was supported at both grade levels suggesting that learning-oriented climate is a critical factor leading to positive responses in PE lessons, independently of the age and the absolute levels of motivational climate and motivational regulations. Thus, it is recommended that PE teachers should employ strategies to increase students' perceptions of motivational climate (for instance TARGET approach, Ames, 1992).

Interestingly, the longitudinal findings of this study did not support our hypotheses (H_{1b}) on the longitudinal effect of learning-climate in adaptive motivational outcomes. In other words, the effect of learning-climate on self-determined motivation and enjoyment at Grade 7 did not transfer directly to Grade 9. However, the learning-climate (T0) – enjoyment (T0) – enjoyment (T1) pattern emerged, indicating that if a student perceived his/her PE climate learning-oriented he/she also enjoyed PE more and this affect seemed to carry over across middle school grade levels.

Unexpectedly, we found that perceptions of learning-oriented climate also related positively to non-self-determined motivation (both introjected and extrinsic regulations) at Grade 7 and to introjected regulation at Grade 9. However, this was a cross-sectional finding without longitudinal support. Therefore, it only can be concluded that students who perceived their PE climate learning-oriented had high self-determined and non-self-determined motivation, but these high levels of both self-determined and non-self-determined motivation were *not* due to an influence of learning-oriented climate. Previously it has been argued that fully intrinsic motivation profile in school context is rare due to the constraining nature of school context (Yli-Piipari et al., 2013). In other words, when pursuing good grades or teacher acceptance, external constrains may drive students into a situation in which free will and possibility to self-determination is greatly diminished.

Effect of Performance-Oriented Climate

Based on the previous studies (Barkoukis et al., 2010; Liukkonen et al., 2010), we hypothesized (H_{1a}) that perceptions of performance-oriented climate relate to maladaptive motivational outcomes, such as increased non-self-determined motivation and amotivation. In accordance with our hypothesis, we found that 7th and 9th graders, who perceived their motivational climate highly performance-oriented, were more extrinsically motivated and amotivated compared to students who perceived their climate as less performance-oriented. This finding is consistent with past research (see Jaakkola & Digelidis, 2007 for an overview) suggesting that performance-oriented climate is associated with maladaptive responses, such as non-self-determined motivation. However, neither performance-oriented climate nor non-self-determined motivation had any negative influence on PE enjoyment. In addition, longitudinal analysis revealed that performance-oriented climate related to increased non-self-determined motivation across time, suggesting that performance-oriented climate may have longitudinal detrimental impact on the quality of adolescents' motivation. These

findings show that competitive situations during the lesson may be perceived as enjoyable and fun by the students. However, a consistent focus of the motivational climate on other-referenced criteria may have detrimental effect on students' motivation. Having in mind that promotion of a learning-oriented climate does not necessarily results in decreasing performance-oriented climate (Barkoukis, Tsorbatzoudis & Grouios, 2008), specific practices should be employed. For instance, although competitive drills and games can be used, PE teachers should avoid placing emphasis on winning and demonstrating competence, arrange opportunities for all children to win, feel competent and successful, and follow students' learning pace.

Mediating Effect of Enjoyment

The findings of this study partially supported our hypothesis (H_2) on the mediating effect of PE enjoyment (Wallhead & Buckworth, 2004). We found that enjoyment was an indirect agent transferring the effect of intrinsic motivation to PA participation. In other words, although intrinsic PE motivation and PA participation were not directly related to each other, intrinsic motivation facilitated PA through student enjoyment. Furthermore, the impact of enjoyment in PE was long lasting. The study showed that if students perceived their PA climate learning-oriented at Grade 7 that related to high enjoyment levels, not only at Grade 7, but at Grade 9. In addition, enjoyable experiences at Grade 7 related, not only to higher PA at Grade 7, but higher PA levels two years later via enjoyment at Grade 9. These findings support the previously reported findings that have shown PE enjoyment to be, not only, an important psychosocial variable linked with increased PA (Carroll & Loumidis, 2001; Garcia Bengoechea et al., 2010; Sallis, Prochaska, & Taylor, 2000), but to be a "link" to understand the relationship between school PE and PA (e.g., Wallhead & Buckworth, 2004). This transfer effect can be occurring in several ways. Firstly, successful task attainment typically results in positive affect (enjoyment) and failure – in negative affect (Mellers, Schwartz, &

Ritov, 1999). Because enjoyable experience in PE is pleasant, this affective state may add emotional incentive to participate in PA during leisure-time. An alternative explanation could be drawn from the trans-contextual model (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Based on the model, self-determined experiences in PE transfer into self-determination in leisure-time and these experiences, in turn, can transfer in to PA behaviour through PA attitudes, subjective norms, and perceived behaviour control. Although this model has received some empirical support (Hagger & Chatzisarantis, 2009), the model does not account for affective responses that may in part explain the PE motivation and PA participation relationship. It is noticeable that enjoyment in PE explained only 10 to 15% of PA participation indicating that PA participation also influenced by numerous other factors (Sallis et al., 2000) alongside to enjoyment in school PE.

Practical Implications

These findings have important implications for physical educators. Most notably, our results encourage PE instructors to imply learning-oriented teaching practices that emphasize self-improvement and task mastery rather than performance-oriented teaching practices that focuses on competition and normative comparisons. In addition, this study supports the previous findings (Dishman et al., 2005) and suggestions (Wallhead & Buckworth, 2004) indicating that enjoyment in PE may be the psychological mediator that carries positive PE experiences over to increased out-of-school PA participation. Given these findings, we believe that PE activities should; (a) match student needs, skills and preferences, (b) be perceived as exciting and challenging by the students, and (c) offer a wide range of involvement choices. It has been argued that failure to consider these characteristics could potentially lead to lack of enjoyment for PE (Ntoumanis, Pensgaard, Martin, & Pipe, 2004).

Limitations and Directions for Future Research

This study has its limitations. First, adolescents' PA was assessed with self-report measures, and therefore the overall weekly PA levels may be biased. For example, Sallis and Saelens (2000) stated that children tend to overestimate their amount of PA activity, given social desirability, and that objective measures, such as accelerometers or pedometers, may give a more accurate indication of amount of activity. However, the validity and reliability of the World Health Organization's Health Behavior in School-Aged Children study has been shown to be acceptable when measuring PA among children and adolescents (Booth, Okely, Chey, & Bauman, 2001; Vuori et al., 2005). Still, future research would benefit by using objective measures of PA participation. Second, although this study was a longitudinal study and it extends the previous correlational findings, experimental studies are needed to establish causal relationships.

Contributions of the study

This study adds to existing literature showing that intrinsic motivation is the vital component of motivation that transfers the effect of learning-oriented climate to long-lasting enjoyment in PE context. In addition, although performance-oriented climate does not have a direct effect on enjoyment, performance-oriented climate has a long-lasting effect on non-self-determined motivation. Finally, the study showed enjoyable experiences in PE to transfer intrinsic motivation into PA participation.

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Footnote

[1]According to SDT extrinsic motivation includes also a fourth regulation, namely integrated regulation, which reflects the integration of behaviour within the self. Integrated regulation is considered to be the more self-determined type of extrinsic as people ‘reciprocally assimilate a new identification with their sense of who they are’ (Deci & Ryan, 2008, p. 16). In the SDT tradition the measurement of integrated regulation has been incorporated in the measures of identified regulation (Deci & Ryan, 2008).

[2]Nicholls (1989) labeled the two goal orientations task and ego orientation. Recently, also the learning and performance orientation terms have been used to describe the motivational climate dimensions.

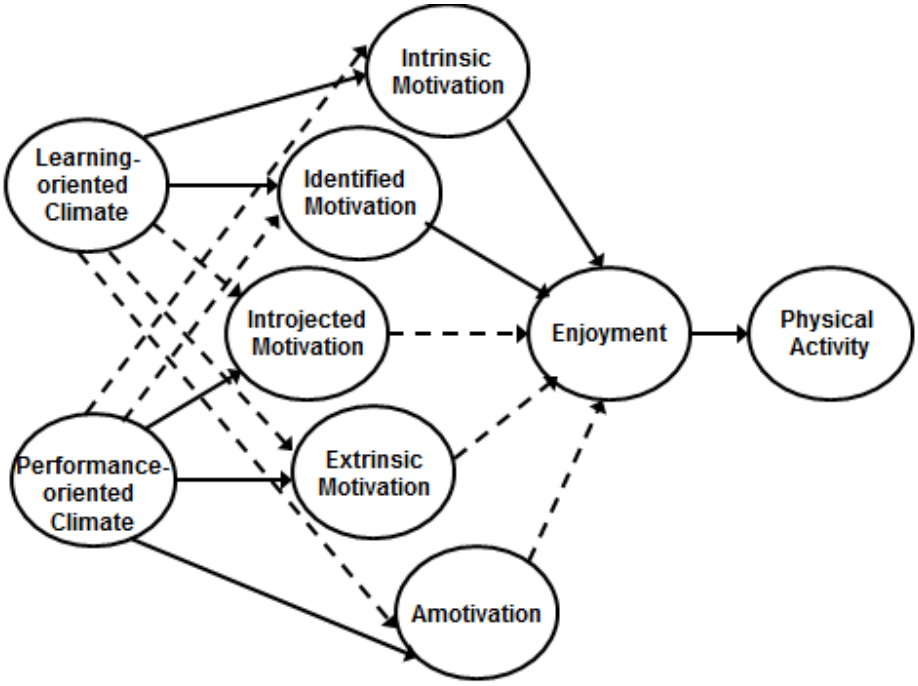

Figure 1. The proposed theoretical framework hypothesized to underlie human motivation and physical activity.

Note. Factor indicators have been omitted from the Figure for presentation purposes. Solid arrows represent the positive relationships, whereas dashed represent the negative.

Table1

Summary of Intercorrelations, Means, Standard Deviations, and Cronbach's Alpha Coefficients for all Latent Factors

Variable list	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Learning-Oriented (T0)	-																	
2 Learning-Oriented (T1)	.39**	-																
3 Performance-Oriented (T0)	.19*	.08	-															
4 Performance-Oriented (T1)	.06	.02	.32**	-														
5 Intrinsic (T0)	.85	.33	.19*	.06	-													
6 Intrinsic (T1)	.46	.72	.15	.19	.46	-												
7 Identified (T0)	.85	.33	.23**	.07	.73	.40	-											
8 Identified (T1)	.44	.58	.18*	.29	.38	.50	.46	-										
9 Introjected (T0)	.66	.26	.30**	.10	.56	.31	.57	.31	-									
10 Introjected (T1)	.41	.67	.21**	.32	.36	.56	.36	.51	.43	-								
11 Extrinsic (T0)	.55	.22	.45**	.15	.48	.27	.49	.30	.43	.28	-							
12 Extrinsic (T1)	.26	.22	.30**	.52	.23	.28	.23	.30	.21	.33	.41	-						
13 Amotivation (T0)	-.33**	-.13	.23**	.08	-.27	-.13	-.26	-.12	-.16	-.10	-.08	-.01	-					
14 Amotivation (T1)	-.16**	-.31**	.11*	.27	-.13	-.18	-.13	-.12	-.08	-.13	-.04	.07	.25	-				
15 Enjoyment (T0)	.68	.27	.09	.03	.66	.33	.69	.33	.42	.27	.39	.17	-.46	-.16	-			
16 Enjoyment (T1)	.51	.64	.11	.10	.47	.68	.46	.52	.37	.61	.28	.20	-.25	-.43	.48	-		
17 Physical activity (T0)	.26	.10	.04	.01	.26	.13	.27	.13	.16	.11	.15	.07	-.18	-.06	.39	.18	-	
18 Physical activity (T1)	.24	.19	.04	.03	.22	.22	.23	.18	.16	.19	.13	.08	-.14	-.13	.28	.32	.47	-
M	3.80[b]	3.52	2.99	3.09	3.23	3.24	3.08	3.11	3.44[b]	3.37	2.67	2.87[b]	2.18	2.40[b]	3.75[b]	3.53	3.96[b]	3.64
SD	.78	.80	.89	.82	.87	.79	.88	.84	.88	.79	.89	.84	.95	.97	.93	1.05	1.99	1.76
α	.80	.85	.86	.86	.92	.93	.73	.80	.69	.70	.71	.78	.77	.83	.93	.94	.90[a]	.92[a]
Skewness	-.49	.18	.08	-.03	-.32	-.25	-.08	-.15	-.16	.01	.08	-.20	.11	-.48	-.65	-.28	-.28	.08

*Note. P * < .05 and ** < .001. [a] instead Cronbach's alpha values, Pearson's correlation coefficient between two items are presented. [b] t test value higher in statistically significant level of p < .001 (between tests at T0 and T1).*

Table 2

Factor Indicator Loadings and Errors along with Model Fit Indices for both Estimated Models

Estimates of Parameters	Regression Model T(0)		Regression Model T(1)	
Learning-Oriented Climate	Standardized Values	Unstandardized Values	Standardized Values	Unstandardized Values
Item 1	.63(.05)	1	.76(.03)	1
Item 2	.70(.05)	1.03(.06)	.82(.03)	1.02(.05)
Item 3	.78(.03)	1.19(.08)	.84(.02)	1.02(.06)
Item 4	.60(.05)	.87(.06)	.73(.03)	.81(.05)
Performance-Oriented Climate				
Item 5	.73(.03)	1	.73(.03)	1
Item 6	.71(.04)	.94(.08)	.75(.03)	.98(.07)
Item 7	.85(.02)	1.12(.07)	.84(.03)	1.08(.05)
Item 8	.81(.03)	1.07(.08)	.81(.03)	1.05(.06)
Intrinsic				
Item 9	.75(.02)	1	.77(.03)	1
Item 10	.82(.02)	1.10(.04)	.84(.02)	1.08(.03)
Item 11	.76(.03)	.94(.05)	.76(.03)	.92(.05)
Item 12	.76(.03)	1.04(.06)	.78(.03)	1.00(.06)
Item 13	.74(.03)	1.03(06)	.76(.03)	.94(06)
Item 14	.64(.03)	.90(.06)	.68(.03)	.87(.05)
Item 15	.76(.02)	1.05(.06)	.80(.02)	1.05(.05)
Item 16	.78(.02)	1.07(.06)	.81(.02)	1.00(.06)
Item 17	.68(.03)	.88(.05)	.69(.03)	.85(.05)
Identified				
Item 18	.72(.05)	1	.77(.03)	1
Item 19	.67(.04)	.90(.07)	.86(.03)	1.08(.06)
Item 20	.64(.04)	.94(.06)	.65(.05)	.91(.08)
Introjected				
Item 21	.53(.05)	1	.63(.05)	1
Item 22	.72(.04)	1.56(.19)	.52(.06)	.85(.15)
Item 23	.67(.04)	1.04(.17)	.71(.06)	1.10(.15)
Extrinsic				
Item 24	.67(.04)	1	.72(.04)	1
Item 25	.59(.04)	.92(.09)	.67(.05)	.87(.07)
Item 26	.76(.03)	1.15(.10)	.81(.03)	1.15(.09)
Amotivation				
Item 27	.70(.04)	1	.76(.03)	1
Item 28	.79(.04)	1.21(.11)	.79(.03)	1.07(.07)
Item 29	.70(.04)	.96(.08)	.81(.03)	.99(.05)
Enjoyment				
Item 30	.88(.01)	1	.77(.02)	1
Item 31	.88(.02)	.98(.03)	.78(.03)	.96(.05)
Item 32	.90(.02)	1.06(.04)	.82(.03)	.98(.06)
Item 33	.87(.02)	1.03(.04)	.88(.02)	1.08(.05)
Physical Activity				
Item 35	.96(.04)	1	.96(.05)	1
Item 36	.85(.04)	.93(.07)	.88(.04)	.98(.10)
Fit of the model	$\chi^2(527) = 779.054$ $p < .001$ CFI = .96 TLI = .95 RMSEA = .049 CI [.046, .053]		$\chi^2(527) = 752.917$ $p < .001$ CFI = .96 TLI = .95 RMSEA = .047 CI [.044, .051]	

Note. Standard errors are in parentheses.

Table 3

Regression Coefficients for the Cross-Sectional Structural Equation Models

Parameter Estimates	Model T0		Model T1	
	Standardized Values (β)	Unstandardized Values (B)	Standardized Values (β)	Unstandardized Values (B)
Learning-Oriented Climate -> Intrinsic Motivation	.65(.04)**	.63(.06)**	.62(.04)**	.58(.06)**
Learning-Oriented Climate -> Identified Regulation	.56(.05)**	.55(.06)**	.45(.06)**	.42(.06)**
Learning-Oriented Climate -> Introjected Regulation	.44(.05)**	.28(.05)**	.50(.06)**	.37 (.06)**
Learning-Oriented Climate -> Extrinsic Motivation	.38(.06)**	.25(.05)**	.07(.06)	.07(.06)
Learning-Oriented Climate -> Amotivation	-.36(.05)**	-.35(.06)**	-.28(.06)**	-.41(.08)**
Performance-Oriented Climate -> Intrinsic Motivation	.06(.04)	.06(.04)	.14(.06)*	.13(.06)*
Performance-Oriented Climate -> Identified Regulation	.09(.05)	.09(.05)	.23(.06)**	.23(.06)**
Performance-Oriented Climate -> Introjected Regulation	.20(.06)**	.12(.04)**	.27(.06)**	.21(.06)**
Performance-Oriented Climate -> Extrinsic Motivation	.38(.06)**	.32(.05)**	.49(.06)**	.48(.07)**
Performance Climate -> Amotivation	.28(.05)**	.27(.05)**	.28(.07)**	.32(.08)**
Intrinsic Motivation -> Enjoyment	.28(.13)**	.31(.14)**	.31(.11)**	.36(.12)**
Identified Regulation -> Enjoyment	.48(.23)*	.60(.29)*	.03(.18)	.03(.20)
Introjected Regulation -> Enjoyment	-.17(.10)	-.33(.20)	-.02(.11)	.02(.16)
Extrinsic Motivation -> Enjoyment	.04(.11)	.07(.16)	.19(.20)	.22(.19)
Amotivation -> Enjoyment	-.23(.06)**	-.30(.08)**	-.32(.05)**	-.31(.05)**
Learning-Oriented Climate-> Enjoyment	.41(.07)**	.51(.09)**	.40(.07)**	.43(.08)**
Enjoyment -> Physical Activity	.38(.05)**	.63(.08)**	.31(.05)**	.61(.09)**

*Note. P values * < .05; ** < .001.*

Table 4

Statistically Significant Regression Coefficients for the Longitudinal Structural Equation Models

Parameter Estimates Longitudinal Relationships	Standardized Values (β)	Unstandardized Values (B)
Learning-Oriented Climate T0 -> Learning-Oriented Climate T1	.39(.05)**	.44(.06)**
Performance-Oriented Climate T0-> Performance-Oriented Climate T1	.33(.06)**	.30(.05)**
Intrinsic Motivation T0 -> Intrinsic Motivation T1	.32(.06)**	.29(.05)**
Identified Regulation T0 -> Identified Regulation T1	.46(.07)**	.48(.08)**
Introjected Regulation T0-> Introjected Regulation T1	.42(.08)**	.29(.06)**
Extrinsic Motivation T0 -> Extrinsic Motivation T1	.42(.06)**	.46(.08)**
Amotivation T0 -> Amotivation T1	.28(.06)**	.31(.07)**
Enjoyment T0 -> Enjoyment T1	.38(.04)**	.32(.06)**
Physical Activity T0 -> Physical Activity T1	.41(.05)**	.44(.05)**
Cross-Lagged Relationships		
Performance-Oriented Climate T0 -> Introjected Regulation T1	.18(.08)**	.16(.07)**
Performance -Oriented Climate T0 -> Extrinsic Regulation T1	.24(.07)**	.23(.07)**
Performance -Oriented Climate T0 -> Amotivation T1	.17(.07)**	.19(.07)**

*Note. P values ** < .001.*

Table 5

Summary of Significant Indirect or Mediation Effects

Variables	Standardized Estimate	Standard Error	*p*	CI 95%
Time 0				
Learning-oriented Climate-> Intrinsic Motivation->Enjoyment	.268	.13	= .046	[.04, .53]
Intrinsic Motivation->Enjoyment-> Physical Activity	.184	.09	= .049	[.01, .37]
Time 1				
Learning-oriented Climate-> Intrinsic Motivation->Enjoyment	.205	.07	= .001	[.09, .32]
Intrinsic Motivation->Enjoyment-> Physical Activity	.096	.09	= .011	[.02, .17]
Temporal Models				
Enjoyment T0->Enjoyment T1-> Physical Activity T1	.131	.04	= .002	[.06, .21]
Learning-oriented Climate T0->Intrinsic Motivation T1->Enjoyment T1	.085	.03	= .001	[.02, .15]