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**Author(s):** Jaakkola, Timo; Yli-Piipari, Sami; Barkoukis, Vassilis; Liukkonen, Jarmo

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

3 **Abstract**

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

25 **Keywords** Self-determined motivation, motivational climate, enjoyment, physical activity  
26

27 Physical inactivity has been one of the leading determinants to double the worldwide  
28 prevalence of obesity since 1980 (World Health Organization, 2013). It has been argued that  
29 schools and physical education (PE) are the most cost-effective channels to affect public  
30 health because of schools' potential to reach the whole age cohort of children and adolescents  
31 (Sallis et al., 2012). However, due to limited amount of weekly PE classes, physical  
32 educators' resources to engage their students in recommended daily 60 minutes of moderate-  
33 to-vigorous PA (U.S. Department of Health and Human Services, 2008) are inadequate.  
34 Thus, the examination of the pathways through which motivational and positive PE  
35 experiences transfer into physically active lifestyle is well warranted. In addition, the  
36 examination of the role of motivational climate in children and adolescent PA has been  
37 suggested as one of the top ten research questions in PE domain (Chen, 2013). Thus, evolving  
38 from the current state of affairs and grounded in self-determination (SDT; Deci & Ryan,  
39 1985) and achievement goal (AGT; Nicholls, 1989) theories, the purpose of the current study  
40 was two-fold. First, we aimed to examine how teacher-initiated motivational climate can  
41 influence student motivation and affect in PE along with their PA participation, and whether  
42 motivational climate has a longitudinal effect across middle school. Second, we aimed to  
43 examine the role of positive affect in explaining the relationship between motivation in PE  
44 and out-of-school PA participation.

#### 45 **Self-Determination Theory**

46 SDT is a prominent theory used to understand human motivation in PA settings. The  
47 theory offers an explanatory framework for the understanding of the quality of motivation  
48 behind volitional and satisfying behaviours (Deci & Ryan, 1985, 2000; Deci, Ryan & Guay,  
49 2013). SDT identifies three major types of motivation existing in any life context; intrinsic  
50 motivation, extrinsic motivation and amotivation<sup>1</sup> (Deci & Ryan, 2000). Intrinsic motivation  
51 represents engagement in an activity for the pleasure and excitement, whereas extrinsic

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

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

## 72 **Achievement Goal Theory (AGT)**

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

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

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

88         Perceptions of learning-oriented climate, as postulated in AGT, result in positive  
89 consequences as compared to perceptions of a performance-oriented climate (Braithwaite,  
90 Spray, & Warburton, 2011). Empirical evidence has shown that learning-oriented climate  
91 relates positively to enjoyment (Barkoukis, Ntoumanis, & Thogersen-Ntoumani, 2010;  
92 Liukkonen, Barkoukis, Jaakkola, & Watt, 2010) and out-of-school PA participation  
93 (Barkoukis & Hagger, 2013), whereas research evidence has indicated that perceptions of  
94 performance-oriented climate display a neutral or negative effect on these outcomes  
95 (Barkoukis & Hagger, 2013). Studies have also demonstrated that learning-oriented climate is  
96 positively associated with self-determined motivation (Ommundsen & Kvalo, 2007;  
97 Standage, Duda, & Ntoumanis, 2003). In the same studies performance-oriented climate has  
98 been found to be unrelated or negatively related with self-determined motivation but  
99 insignificantly associated with amotivation (Ommundsen & Kvalo, 2007; Standage et al.,  
100 2003).

101 **Enjoyment**

102           Based on the conceptualization of Scanlan and Simons (1992), we operationalized  
103 enjoyment as a positive affective response to a certain activity that corresponds to states  
104 experienced during PE participation and described as “enjoy,” “happy,” “like,” and “fun.” In  
105 this sense, enjoyment differs from the SDT postulated intrinsic motivation and it should be  
106 viewed as a broader and more inclusive construct (Fairclough, 2003; Scanlan & Lewthwaite,  
107 1986). Whereas intrinsic motivation refers to internal locus of causality in participation  
108 (participation is due to totally intrinsic reasons, such as stimulation, pleasure, excitement),  
109 enjoyment corresponds to experienced affective outcome of the participation (enjoyment,  
110 happiness).

111           Previous studies have shown that students’ perceptions of learning-oriented climate  
112 have a direct positive association with PE enjoyment (perceptions of performance-oriented  
113 climate have a negative relation) (Barkoukis, Hagger, Lambropoulos & Tsorbatzoudis, 2010).  
114 In addition, students’ enjoyment in PE has been found to be an important affective variable  
115 linked with increased PA (Garcia Bengoechea, Sabiston, Ahmed, & Farnous, 2010;  
116 Papaioannou, Bebetos, Theodorakis, Christodoulidis, & Kouli, 2006; Wang, Chatzisarantis,  
117 Spray, & Biddle, 2002) and it has been found to mediate the effectiveness of a school-based  
118 PA intervention (Dishman et al., 2005). In fact, previous studies have suggested enjoyment in  
119 PE to be a missing link between motivation in school PE and PA (e.g., Wallhead &  
120 Buckworth, 2004). The basic premise of this assumption is that if school PE increases  
121 students’ positive affect, such as enjoyment, these affective outcomes will transfer into  
122 motivation to adopt a physically active lifestyle in other contexts (Wallhead & Buckworth,  
123 2004). This assumption is based on theory and empirical findings suggesting that the  
124 experience of enjoyment is a critical factor in determining one’s motivation for and continued  
125 participation in exercise settings (Kremer, Trew, & Ogle, 1997).

## 126 **The Present Study**

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

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

152 oriented PE climate, self-determined motivation, and enjoyment have found to be related  
153 positively to PA (Braithwaite et al., 2011), there is a lack of studies examining the pathways  
154 through which teacher-initiated motivational climate in PE can impact students' PA  
155 participation. It is important to recognize that PE motivation and overall PA motivation are  
156 conceptually different hence they occur in different contexts. In other words, a student may  
157 have high PE motivation but low motivation to be physically active during leisure-time.  
158 Thus, this study was to examine the argument suggesting that PE enjoyment is a "missing  
159 link" to explain the transfer of PE motivation on PA participation (Wallhead & Buckworth,  
160 2004). The present study views PE enjoyment as a possible mediator of the effect of  
161 motivational climate and motivational regulations in PE on PA participation.

162 We tested the following research hypotheses.  $H_{1a}$ : We hypothesized that perceptions  
163 of learning-oriented climate relates to higher self-determined motivation, lower amotivation,  
164 higher enjoyment, and higher PA participation across both grade levels (Barkoukis & Hagger,  
165 2013; Standage et al., 2003). In contrast, perceived performance-oriented climate was  
166 assumed to relate to maladaptive pattern, such as higher non-self-determined motivation,  
167 amotivation and lower enjoyment and lower levels of PA.  $H_{1b}$ : We hypothesized that  
168 learning-oriented climate at Grade 7 predicts, not only learning-oriented climate but also self-  
169 determined motivation at Grade 9; In contrast, we hypothesized that performance-oriented  
170 climate at Grade 7 predicts, not only performance-oriented climate but also non-self-  
171 determined motivation at Grade 9 (Barkoukis & Hagger, 2013).  $H_2$ : We hypothesized that  
172 enjoyment is a significant mediator between self-determined motivation in PE and PA.  
173 Specifically, we hypothesized that enjoyment mediates between motivation in PE and PA,  
174 self-determined motivation relating to higher PE enjoyment and PA (Wallhead & Buckworth,  
175 2004).

176

## Method



**177 Participants**

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

**191 Research Context**

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

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

### 207 **Measures**

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

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

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

227 1995). The Physical Education Motivation Scale consists of five subscales comprising nine  
 228 items of intrinsic motivation and three items of identified, introjected, and external  
 229 regulation, and amotivation. Each item was rated on a five-point Likert scale (1 = *does not*  
 230 *correspond at all... 5 = corresponds exactly*). The scale used in this study had the individual  
 231 item stem, “*I’m currently participating in physical education, because...*”. Construct validity  
 232 and internal consistency of the PEMS have been found to be satisfactory (Jaakkola 2002).

233 **Enjoyment.** The Finnish version of the Sport Enjoyment Scale (Scanlan, Carpenter,  
 234 Schmidt, Simons, & Keeler, 1993) was used to assess enjoyment in PE lessons (Soini et al.,  
 235 2007). The scale measures one dimension of enjoyment with four items. The items of the  
 236 original version were modified to measure enjoyment during PE lessons (example item, “*I*  
 237 *have fun during PE lessons*”). Participants responded on a five-point Likert scale with a range  
 238 from 1 (*not at all*) to 5 (*very much*). Construct validity and internal consistency of the Sport  
 239 Enjoyment Scale have found to be satisfactory (Soini, Liukkonen, Jaakkola, Leskinen, &  
 240 Rantanen, 2007).

241 **Physical activity.** To assess adolescents’ self-report PA, the Health Behavior in  
 242 School-aged Children Research Protocol was used (Currie, Samdal, Boyce, & Smith, 2002).  
 243 The scale was to measure on how many days in the week students are meeting a 60-minute  
 244 moderate-to-vigorous PA recommendation (U.S. Department of Health and Human Services,  
 245 2008). The scale consisted of two items and was rated on an eight-point response scale (0 - 7  
 246 days of the week). The introduction for the scale was: “*In the next two questions PA means*  
 247 *all activities which raise your heart rate or momentarily gets you out of breath, for ex-ample,*  
 248 *in doing exercise, playing with your friends, going to school, or in school PE. PA also*  
 249 *includes for example jogging, intensive walking, roller skating, cycling, dancing, skating,*  
 250 *skiing, soccer, basketball and baseball.*” The items were: (a) “*Think about your typical week.*  
 251 *How many days did you exercise for at least 60 min. during which you got out of breath*” and

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

### 257 **Statistical Analyses**

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

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

## 289 Results

### 290 Preliminary Analyses

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

301 in PA. Enjoyment in PE had a positive and moderate relationship with participation in PA.  
302 Finally, a Bonferroni-corrected paired  $t$  test showed adolescents' perception of learning-  
303 oriented climate ( $t(515) = 6.97, p < .001$ ), PE enjoyment ( $t(529) = 4.74, p < .001$ ), and  
304 participation in PA ( $t(520) = 3.47, p < .001$ ) to decline, while extrinsic regulation ( $t(529) =$   
305  $4.73, p < .001$ ) and amotivation ( $t(528) = 4.16, p < .001$ ) increased.

### 306 **Structural Equation Models**

307 A SEM was conducted to test the hypothesis 1a *separately* at Grade 7 and 9 (Figure  
308 1). The fit indices showed that the model that included all factor indicators and structural  
309 pathways from perceptions of learning and performance-oriented climates via the different  
310 dimensions of self-determined motivation to enjoyment and PA fitted the data acceptably  
311 across both time points: Model T0  $\chi^2(528) = 803.013, p < .001$ , CFI = .95, TLI = .94, and  
312 RMSEA = .052, 90% CI[.05, .07]; Model T1  $\chi^2(528) = 782.778, p < .001$ , CFI = .95, TLI =  
313 .94, and RMSEA = .054, 90% CI[.05, .07]. However, the residual variance of the latent  
314 intrinsic motivation factors for both models was negative. Inspection of modification indices  
315 showed that both models would be improved if an alternative path from perception of  
316 learning-oriented climate directly to enjoyment was estimated. This modification is  
317 empirically justified, considering that learning-oriented climate has found to be related  
318 directly to both self-determined motivation and to enjoyment (Braithwaite et al., 2011). The  
319 data fitted new models acceptably: Model T0  $\chi^2(527) = 779.054, p < .001$ , CFI = .96, TLI =  
320 .95, and RMSEA = .049, 90% CI[.046, .053]; Model T1  $\chi^2(527) = 752.917, p < .001$ , CFI =  
321 .96, TLI = .95, and RMSEA = .047, 90% CI[.044, .051]. Table 2 presents fit indices and all  
322 factor loadings of the final models.

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

326 = .44,  $\beta_{ex} = .38$ ; T1:  $\beta_{intr} = .50$ ), and negatively to amotivation (T0:  $\beta_{am} = -.36$ ; T1:  $\beta_{am} = -$   
 327 .28). Self-determined motivation associated positively with enjoyment (T0:  $int \rightarrow enj \beta = .28$ ,  
 328  $id \rightarrow enj \beta = .48$ ; T1:  $\beta = .32$ ), whereas non-self-determined did not. On the contrary,  
 329 perceptions of performance-oriented climate positively related to non-self-determined  
 330 motivation (T0:  $\beta_{intro} = .20$ ,  $\beta_{ex} = .37$ ; T1:  $\beta_{intr} = .27$ ;  $\beta_{ex} = .49$ ) and amotivation (T0:  $\beta_{am}$   
 331 = .28; T1:  $\beta_{am} = .28$ ). In addition, amotivation was negatively associated with enjoyment  
 332 (T0:  $\beta_{enj} = -.23$ ; T1:  $\beta = -.32$ ), enjoyment related positively to PA (T0:  $\beta_{pa} = .38$ ; T1:  $\beta = .31$ ),  
 333 and intrinsic motivation had positive but indirect relationship with PA via enjoyment ( $\beta =$   
 334 .18). The sizes of the effects were weak to strong explaining the 10% to 70% of the variances  
 335 of the dependent variables:  $R^2$ : intrinsic motivation = .45(.05)/.47(.06); identified regulation =  
 336 .33(.06)/.32(.05); introjected regulation = .26(.05)/.41(.05); external regulation =  
 337 .26(.05)/.27(.05); amotivation = .18(.04)/.15(.04); enjoyment = .64(.05)/.70(.05); PA =  
 338 .15(.03)/.10(.03) (presented as T0/T1)[the standard errors are presented in the parentheses].

339 To test the hypothesis 1b, regressions coefficients from T0 variables to T1 variables  
 340 were implemented to test possible longitudinal effects between research variables. The fit of  
 341 this model was acceptable:  $\chi^2(1403) = 23128.809$ ,  $p < .001$ , CFI = .95, TLI = .95, RMSEA =  
 342 .031, 90% CI [.028, .034]. Similarly to the previously estimated cross-sectional models, the  
 343 residual variance of the latent intrinsic motivation factor was negative. Therefore, additional  
 344 direct paths from learning-oriented climate to enjoyment (both T0 and T1) were estimated.  
 345 The new model fit was acceptable:  $\chi^2(1400) = 2099.257$ ,  $p < .001$ , CFI = .95, TLI = .95,  
 346 RMSEA = .030, 90% CI [.028, .033]. The results of the significant relationships are presented  
 347 in the Table 4. The results showed that students' perceptions of their motivational climate,  
 348 motivational regulations, amotivation, enjoyment, and PA participation were relatively stable  
 349 across time standardized regression coefficients ranging from .28 to .46. In addition, only

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

352 To test the second hypothesis, the possible mediating role of enjoyment was examined  
353 based on 5,000 bootstrapped samples. The study showed a statistically significant indirect  
354 relationship from learning-oriented PE climate via PE enjoyment to PA participation in both  
355 7<sup>th</sup> (95% asymmetric CI ranged from .01 to .37) and 9<sup>th</sup> (95% asymmetric CI ranged from .02  
356 to .17) grades (Table 5). In addition, a longitudinal indirect relationship from enjoyment at T0  
357 via enjoyment at T1 to PA at T1 was established (95% asymmetric CI ranged from .06 to  
358 .21). Considering the found direct relationship between learning-oriented climate and  
359 enjoyment, we expanded our analyses and investigated the possible mediating role of  
360 intrinsic motivation. The study showed that intrinsic motivation in PE mediated the  
361 relationships between learning-oriented PE climate and enjoyment in both 7<sup>th</sup> (95%  
362 asymmetric CI ranged from .04 to .53) and 9<sup>th</sup> (95% asymmetric CI ranged from .09 to .32)  
363 grades (Table 5). Furthermore, a longitudinal indirect relationship from learning-oriented  
364 climate at T0 to enjoyment at T1 via intrinsic motivation at T1 (95% asymmetric CI ranged  
365 from .02 to .15) and learning-oriented climate at T0 to enjoyment at T1 via enjoyment at T0  
366 (95% asymmetric CI ranged from .09 to .25) emerged.

## 367 **Discussion**

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



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

### 376 **Effect of Learning-Oriented Climate**

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

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

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

#### 409 **Effect of Performance-Oriented Climate**

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

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

### 432 **Mediating Effect of Enjoyment**

433         The findings of this study partially supported our hypothesis ( $H_2$ ) on the mediating  
434 effect of PE enjoyment (Wallhead & Buckworth, 2004). We found that enjoyment was an  
435 indirect agent transferring the effect of intrinsic motivation to PA participation. In other  
436 words, although intrinsic PE motivation and PA participation were not directly related to each  
437 other, intrinsic motivation facilitated PA through student enjoyment. Furthermore, the impact  
438 of enjoyment in PE was long lasting. The study showed that if students perceived their PA  
439 climate learning-oriented at Grade 7 that related to high enjoyment levels, not only at Grade  
440 7, but at Grade 9. In addition, enjoyable experiences at Grade 7 related, not only to higher PA  
441 at Grade 7, but higher PA levels two years later via enjoyment at Grade 9. These findings  
442 support the previously reported findings that have shown PE enjoyment to be, not only, an  
443 important psychosocial variable linked with increased PA (Carroll & Loumidis, 2001; Garcia  
444 Bengoechea et al., 2010; Sallis, Prochaska, & Taylor, 2000), but to be a "link" to understand  
445 the relationship between school PE and PA (e.g., Wallhead & Buckworth, 2004). This  
446 transfer effect can be occurring in several ways. Firstly, successful task attainment typically  
447 results in positive affect (enjoyment) and failure – in negative affect (Mellers, Schwartz, &

448 Ritov, 1999). Because enjoyable experience in PE is pleasant, this affective state may add  
449 emotional incentive to participate in PA during leisure-time. An alternative explanation could  
450 be drawn from the trans-contextual model (Hagger, Chatzisarantis, Culverhouse, & Biddle,  
451 2003). Based on the model, self-determined experiences in PE transfer into self-  
452 determination in leisure-time and these experiences, in turn, can transfer in to PA behaviour  
453 through PA attitudes, subjective norms, and perceived behaviour control. Although this  
454 model has received some empirical support (Hagger & Chatzisarantis, 2009), the model does  
455 not account for affective responses that may in part explain the PE motivation and PA  
456 participation relationship. It is noticeable that enjoyment in PE explained only 10 to 15% of  
457 PA participation indicating that PA participation also influenced by numerous other factors  
458 (Sallis et al., 2000) alongside to enjoyment in school PE.

#### 459 **Practical Implications**

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

#### 471 **Limitations and Directions for Future Research**

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

#### 483 **Contributions of the study**

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

490 **References**

- 491 Ames, C. (1992). The relationship of achievement goals to student motivation in classroom  
492 settings. In G. Roberts (Ed.). *Motivation in sport and exercise* (pp. 161-176).  
493 Champaign, IL: Human Kinetics.
- 494 Annerstedt, C. (2008). Physical education in Scandinavia with a focus on Sweden: A  
495 comparative perspective. *Physical Education & Sport Pedagogy, 13*, 303–318. doi:  
496 10.1080/17408980802353354
- 497 Asparouhov, T. (2005). Sampling weights in latent variable modeling. *Structural Equation*  
498 *Modeling, 12*, 411-434. doi:10.1207/s15328007sem1203\_4
- 499 Barkoukis, V., & Hagger, M. S. (2013). The trans-contextual model: Perceived learning and  
500 performance motivational climates as analogues of perceived autonomy support.  
501 *European Journal of Psychology of Education, 28*, 353-372. doi: 10.1007/s10212-012-  
502 0118-5
- 503 Barkoukis, V., Hagger, M., S., Labropoulos, G., & Tsorbatzoudis, H. (2010). Extending the  
504 trans-contextual model in physical education and leisure-time contexts: Examining the  
505 role of basic psychological need satisfaction. *British Journal of Educational*  
506 *Psychology, 80*, 647-670. doi: 10.1348/000709910X487023
- 507 Barkoukis, V., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). Developmental changes in  
508 achievement motivation and affect in physical education: Growth trajectories and  
509 demographic differences. *Psychology of Sport and Exercise, 11*, 83-90. doi:  
510 10.1016/j.psychsport.2009.04.008
- 511 Barkoukis, V., Tsorbatzoudis, H., & Grouios, G. (2008). Manipulation of motivational  
512 climate in physical education: Effects of a seven-month intervention. *European*  
513 *Physical Education Review, 14*, 367-387.

- 514 Booth, M. L., Okely, A. D., Chey, T., & Bauman, A. (2001). The reliability and validity of  
515 the physical activity questions in the WHO health behaviour in schoolchildren (HBSC)  
516 survey: A population study. *British Journal of Sports Medicine*, *35*, 263–267. doi:  
517 10.1136/bjism.35.4.263
- 518 Braithwaite, R., Spray, C. M., & Warburton, V. E. (2011). Motivational climate interventions  
519 in physical education: A meta-analysis. *Psychology of Sport and Exercise*, *12*, 628 -  
520 638. doi: 10.1016/j.psychsport.2011.06.005
- 521 Carroll, B., & Loumidis, J. (2001). Children’s perceived competence and enjoyment in  
522 physical education and physical activity outside school. *European Physical Education*  
523 *Review*, *7*, 24-43.
- 524 Chen, A. (2013). Top 10 research questions related to children physical activity motivation.  
525 *Research Quarterly for Exercise and Sport*, *84*, 441-447. doi:  
526 10.1080/02701367.2013.844030
- 527 Collins, L. M., Schafer, J.L., & Kam, C-M. (2001). A comparison of inclusive and restrictive  
528 strategies in modern missing data procedures. *Psychological Methods*, *6*, 330-351. doi:  
529 10.1037//1082-989X.6.4.330
- 530 Currie, C., Samdal, O., Boyce, W., & Smith, B. (2002). *Health behavior in school-aged*  
531 *children: A WHO cross-national study. Research protocol for the 2001–2002 survey.*  
532 Edinburgh: University of Edinburgh.
- 533 Deci, E. & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior.*  
534 New York: Plenum Press.
- 535 Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and  
536 the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268.

- 537 Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-  
538 being across life's domains. *Canadian Psychology, 49*, 14-23. doi: 10.1037/0708-  
539 5591.49.1.14
- 540 Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In P. A. M. Van Lange, A. W.  
541 Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology: Vol. 1*  
542 (pp. 416-437). Thousand Oaks, CA: Sage.
- 543 Deci, E. L., Ryan, R. M., & Guay, F. (2013). Self-determination theory and actualization of  
544 human potential. In D. McInerney, H. Marsh, R. Craven, & F. Guay (Eds.), *Theory*  
545 *driving research: New wave perspectives on self processes and human development*  
546 (pp. 109-133). Charlotte, NC: Information Age Press.
- 547 Dishman, R. K., Motl, R. W., Saunders, R., Felton, G., Ward, D. S., Dowda, M., . . . Pate, R.  
548 (2005). Enjoyment mediates effects of a school-based physical-activity intervention.  
549 *Medicine and Science in Sports and Exercise, 37*, 478–487. doi:  
550 10.1249/01.MSS.0000155391.62733.A7
- 551 Duda, J. L., & Balaguer, I. (2007). Coach-created motivational climate. In S. Jowett & D.  
552 Lavalley (Eds), *Social psychology in sport* (pp. 117-130). Champaign, IL: Human  
553 Kinetics.
- 554 Fairclough, S. (2003). Physical activity, perceived competence and enjoyment during  
555 secondary school physical education. *European Journal of Physical Education, 8*, 5-18.
- 556 Garcia Bengoechea, E., Sabiston, C. M., Ahmed, R., & Farnous, M. (2010). Exploring links  
557 to unorganized and organized physical activity during adolescence: The role of gender,  
558 socioeconomic status, weight status, and enjoyment of physical education. *Research*  
559 *Quarterly for Exercise and Sport, 81*, 7-16.



- 560 Hagger, M. S., & Chatzisarantis, N. L. (2009). Integrating the theory of planned behaviour  
561 and self-determination theory in health behaviour: A meta-analysis. *British journal of*  
562 *health psychology, 14*, 275-302.
- 563 Hagger, M. S., Chatzisarantis, N. L., Culverhouse, T., & Biddle, S. J. H. (2003). The process  
564 by which perceived autonomy support in physical education promotes leisure-time  
565 physical activity intentions and behavior: A trans-contextual model. *Journal of*  
566 *Educational Psychology, 95*, 784-795. doi: 10.1037/0022-0663.95.4.784
- 567 Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new  
568 millennium. *Communication Monographs, 76*, 408–420. doi:  
569 10.1080/03637750903310360
- 570 Heikinaro-Johansson, P., & Telama, R. (2005). Physical education and health in Finland. In  
571 U. Pühse & M. Gerber (Eds.), *International comparison of physical education—*  
572 *Concepts, problems, prospects* (pp. 250–271). Aachen, Germany: Mayer & Meyer.
- 573 Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure  
574 analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling:*  
575 *A Multidisciplinary Journal, 6*, 1-55. doi: 10.1080/10705519909540118
- 576 Jaakkola, T. (2002). *Changes in students' exercise motivation, goal orientation and sport*  
577 *competence as a result of modifications in school physical education teaching*  
578 *practices*. Likes-Research Reports on Sport and Health 131. Jyväskylä: LIKES-research  
579 Center.
- 580 Jaakkola, T. & Digelidis, N. (2007). Establishing a positive motivational climate in physical  
581 education. In J. Liukkonen, Y. Vanden Au-weele, B. Vereijken, D. Alfermann, & Y.  
582 Theodorakis (Eds.), *Psychology for physical educators: Student in focus* (2<sup>nd</sup> ed.; pp. 3-  
583 20). Champaign: Human Kinetics.

- 584 Kremer, J., Trew, K., & Ogle, S. (1997). *Young people's involvement in sport*. London, UK:  
585 Routledge.
- 586 Liukkonen, J., Barkoukis, V., Watt, A., & Jaakkola, T. (2010). The relationship between  
587 motivational climate and students' emotional experiences and effort in school physical  
588 education. *Journal of Educational Research*, 103, 295-308. doi:  
589 10.1080/00220670903383044
- 590 Mellers, B., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental*  
591 *Psychology*, 128, 332–345.
- 592 Muthén, L. K., & Muthén, B. O. (1998 – 2013). *Mplus user's guide 6<sup>th</sup> edition*. Los Angeles,  
593 CA: Author.
- 594 Nicholls, J. (1989). *The competitive ethos and democratic education*. London: Harvard  
595 University Press.
- 596 Ntoumanis, N., Pensgaard, A. M., Martin, C., & Pipe, K. (2004). Anidiographic analysis of  
597 amotivation in compulsory school physical education. *Journal of Sport & Exercise*  
598 *Psychology*, 26, 197-214.
- 599 Ommundsen, Y., & Kvalø, S. (2007). Autonomy-mastery, supportive or performance  
600 focused? Different teacher behaviours and pupils' outcomes in physical education.  
601 *Scandinavian Journal of Educational Research*, 51, 385-413. doi:  
602 10.1080/00313830701485551
- 603 Papaioannou, A., Bebetos, E., Theodorakis, Y., Christodoulidis, T., & Kouli, O. (2006).  
604 Causal relationships of sport and exercise involvement with goal orientations, perceived  
605 competence and intrinsic motivation in physical education: A longitudinal study.  
606 *Journal of Sports Sciences*, 24, 367-382. doi:10.1080/02640410400022060

- 607 Pelletier, L., Fortier, M., Vallerand, R., Tuson, K., & Briere, N. (1995). Toward a new  
608 measure of intrinsic motivation, extrinsic motivation and amotivation in sports: The  
609 Sport Motivation Scale (SMS). *Journal of Sport and Exercise Psychology, 17*, 35-53.
- 610 Prochaska, J. J., Sallis, J. F., & Long, B. (2001). A physical activity screening measure for  
611 the use with adolescents in primary care. *Archives in Pediatric Adolescence Medicine,*  
612 *155*, 554-559.
- 613 Roberts, G. C. (2012). Motivation in sport and exercise from an achievement goal theory  
614 perspective: After 30 years, where are we? In G. C. Roberts & D. Treasure (Eds.),  
615 *Advances in motivation in sport and exercise* (pp. 5-58). Champaign, IL: Human  
616 Kinetics.
- 617 Sallis, J. F., McKenzie, T. L., Beets, M. W., Beighle, A., Erwin, H., & Lee, S. (2012).  
618 Physical education's role in public health: Steps forward and backward over 20 years  
619 and HOPE for the future. *Research Quarterly for Exercise and Sport, 83*, 125-135.
- 620 Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical  
621 activity of children and adolescents. *Medicine and Science in Sports and Exercise, 32*,  
622 963-975.
- 623 Sallis, J. F., & Saelens, B. E. (2000). Assessment of physical activity by self-report: status,  
624 limitations, and future directions. *Research Quarterly for Exercise and Sport, 71*, 1-  
625 14.
- 626 Scanlan, T. K., Carpenter, P. J., Schmidt, G. W., Simons, J. P. & Keeler, B. (1993). The sport  
627 commitment model: Development for the youth-sport domain. *Journal of Sport and*  
628 *Exercise Psychology, 15*, 16-38.
- 629 Scanlan, T. K., & Lewthwaite, R. (1986). Social psychological aspects of competition for  
630 male youth sport participants: Predictors of enjoyment: IV. *Journal of Sport*  
631 *Psychology, 8*, 25-35.

- 632 Scanlan, T. K., & Simons, J. P. (1992). The construct of sport enjoyment. In G. Roberts (Ed.),  
633 *Motivation in sport and exercise* (pp. 199–215). Champaign, IL: Human Kinetics.
- 634 Soini, M., Liukkonen, J., Watt, A., Yli-Piipari, S., & Jaakkola, T. (2014). Factorial validity  
635 and internal consistency of the Motivational Climate in Physical Education Scale.  
636 *Journal of Sports Science and Medicine, 3*, 137-144.
- 637 Soini, M., Liukkonen, J., Jaakkola, T., Leskinen, E., & Rantanen, P. (2007).  
638 Motivaatioilmasto ja viihtyminen koululiikunnassa. [Motivational climate and  
639 enjoyment of physical education in school]. *Liikunta & Tiede, 44*, 45-51.
- 640 Standage, M., Duda, J. L. & Ntoumanis, N. (2003). A model of contextual motivation in  
641 physical education: Using constructs from self-determination and achievement goal  
642 theories to predict physical activity intentions. *Journal of Educational Psychology, 95*,  
643 97-110. doi: 10.1037/0022-0663.95.1.97
- 644 Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise,  
645 physical activity, and self-determination theory: A systematic review. *International*  
646 *Journal of Behavioral Nutrition and Physical Activity, 9*, 78.
- 647 U.S. Department of Health and Human Services. (2008). Physical activity guidelines for  
648 Americans. Retrieved from the U.S. Department of Health website:  
649 <http://www.health.gov/paguidelines/pdf/paguide.pdf>.
- 650 Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In  
651 M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 271-360). San  
652 Diego, CA: Academic Press.
- 653 Vallerand, R. J. (2007). Intrinsic and extrinsic motivation in sport and physical activity. A  
654 review and a look at the future. In Tenenbaum, G.C. & Eklund, R. C. (Eds.), *Handbook*  
655 *of sport psychology* (pp. 59-83). New York: John Wiley.

- 656 Vuori, M., Ojala, K., Tynjälä, J., Villberg, J., Välimaa, R., & Kannas, L. (2005). Liikunta-  
657 aktiivisuutta koskevien kysymysten stabiliteetti WHO-Koululaistutkimuksessa.  
658 [Stability of the Finnish WHO physical activity questionnaire]. *Liikunta ja Tiede*, 42,  
659 39–46.
- 660 Wallhead, T. L., & Buckworth, J. (2004). The role of physical education in the promotion of  
661 youth physical activity. *Quest*, 56, 285-301.
- 662 Wang, C. K. J., Chatzisarantis, N. L. D., Spray, C. M., & Biddle, S. J. H. (2002).  
663 Achievement goal profiles in school physical education: Differences in self-  
664 determination, sport ability beliefs, and physical activity. *British Journal of*  
665 *Educational Psychology*, 72, 433– 445. doi:10.1348/000709902320634401
- 666 World Health Organization (2013). World Health Organization Global Infobase. Retrieved  
667 from <https://apps.who.int/infobase/>
- 668 Yli-Piipari, S. (2014). Physical education reform in Finland. *Quest* (in press).
- 669 Yli-Piipari, S., Barkoukis, V., Liukkonen, J., & Jaakkola, T. (2013). The effect of physical  
670 education cognition and affect in adolescent physical activity: A parallel process latent  
671 growth analysis. *Sport, Exercise, and Performance Psychology*, 2, 15–31.  
672 doi:10.1037/a0029806

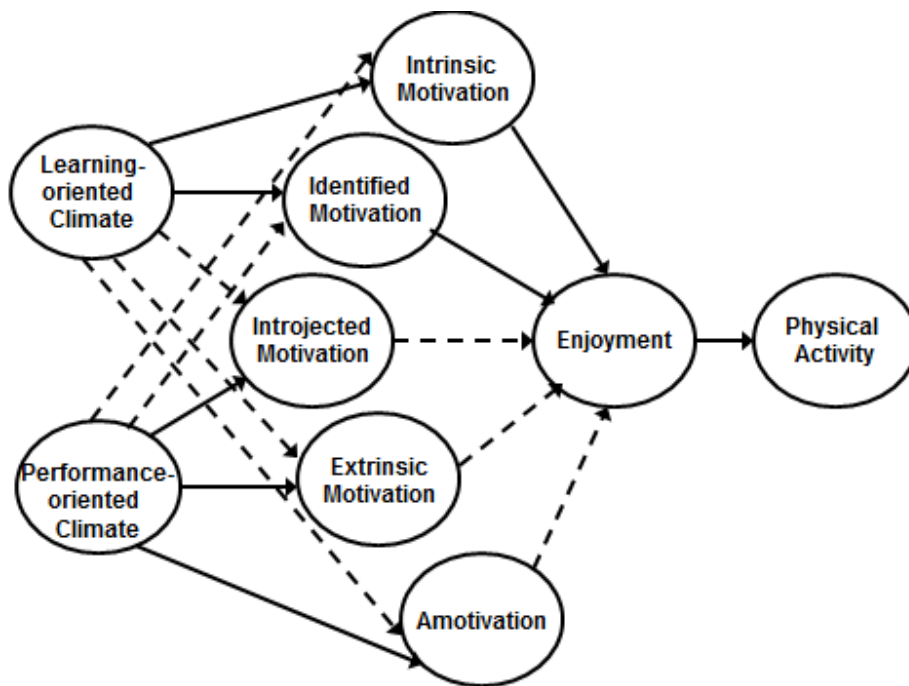
673

674 **Footnote**

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

681

682 <sup>2</sup>Nicholls (1989) labeled the two goal orientations task and ego orientation. Recently, also the  
683 learning and performance orientation terms have been used to describe the motivational  
684 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	-
<i>M</i>	3.80 <sup>b</sup>	3.52	2.99	3.09	3.23	3.24	3.08	3.11	3.44 <sup>b</sup>	3.37	2.67	2.87 <sup>b</sup>	2.18	2.40 <sup>b</sup>	3.75 <sup>b</sup>	3.53	3.96 <sup>b</sup>	3.64
<i>SD</i>	.78	.80	.89	.82	.87	.79	.88	.84	.88	.79	.89	.84	.95	.97	.93	1.05	1.99	1.76
$\alpha$	.80	.85	.86	.86	.92	.93	.73	.80	.69	.70	.71	.78	.77	.83	.93	.94	.90 <sup>a</sup>	.92 <sup>a</sup>
Skewness	-.49	.18	.08	-.03	-.32	-.25	-.08	-.15	-.16	.01	.08	-.20	.11	-.48	-.65	-.28	-.28	.08

*Note.*  $P^* < .05$  and  $** < .001$ . <sup>a</sup> instead Cronbach's alpha values, Pearson's correlation coefficient between two items are presented. <sup>b</sup> *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)	
	Standardized Values	Unstandardized Values	Standardized Values	Unstandardized Values
Learning-Oriented Climate				
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 ( $\beta$ )	Unstandardized Values (B)	Standardized Values ( $\beta$ )	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	Standardized Values ( $\beta$ )	Unstandardized Values (B)
<u>Longitudinal Relationships</u>		
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)**
<u>Cross-Lagged Relationships</u>		
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	<i>p</i>	CI 95%
<u>Time 0</u>				
Learning-oriented Climate-> Intrinsic Motivation->Enjoyment	.268	.13	= .046	[.04, .53]
Intrinsic Motivation->Enjoyment-> Physical Activity	.184	.09	= .049	[.01, .37]
<u>Time 1</u>				
Learning-oriented Climate-> Intrinsic Motivation->Enjoyment	.205	.07	= .001	[.09, .32]
Intrinsic Motivation->Enjoyment-> Physical Activity	.096	.09	= .011	[.02, .17]
<u>Temporal Models</u>				
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]