Research article

Students' Perceptions of Motivational Climate and Enjoyment in Finnish Physical Education: A Latent Profile Analysis

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Abstract
The purpose of this study was to identify student clusters with homogenous profiles in perceptions of task- and ego-involving, autonomy, and social relatedness supporting motivational climate in school physical education. Additionally, we investigated whether different motivational climate groups differed in their enjoyment in PE. Participants of the study were 2 594 girls and 1 803 boys, aged 14 -15 years. Students responded to questionnaires assessing their perception of motivational climate and enjoyment in physical education. Latent profile analyses produced a five-cluster solution labeled 1) 'low autonomy, relatedness, task, and moderate ego climate' group', 2) 'low autonomy, relatedness, and high task and ego climate, 3) 'moderate autonomy, relatedness, task and ego climate' group 4) 'high autonomy, relatedness, task, and moderate ego climate' group, and 5) 'high relatedness and task but moderate autonomy and ego climate' group. Analyses of variance showed that students in clusters 4 and 5 perceived the highest level of enjoyment whereas students in cluster 1 experienced the lowest level of enjoyment. The results showed that the students' perceptions of various motivational climates created differential levels of enjoyment in PE classes.

Key words: Motivational climate, enjoyment, physical education, clusters.

Introduction

Enjoyment can be seen as the most important affective consequence of quality physical education (PE) (Cairney et al., 2012; Dishman et al., 2005). For example, enjoyment has been proposed to be an important factor increasing physical activity in PE and leisure time within children and adolescents (Wallhead and Buckworth, 2004; Wang et al., 2010). In this study enjoyment is determined as positive general affect that relates to feelings of fun, liking and pleasure (Scanlan and Simmons, 1992). The achievement goal theory (AGT; Nicholls, 1989) and the self-determination theory (SDT; Deci and Ryan, 1985) represent widely utilized frameworks in research concerning enjoyment in PE (e.g., Ommundsen and Eikanger-Kvalø, 2007; Standage et al., 2005; Wang et al., 2010).

The achievement goal theory (Nicholls, 1989) suggests that an individual's main motive is to demonstrate competence when involved in achievement settings (Nicholls, 1989). The AGT includes two main elements: a) perception of individual's competence towards an activity (goal orientation), and b) perception

of social environment (motivational climate). In this study we only adopted the construct of motivational climate which relates to psychological environment directing the goals in achievement situations in PE (Ames, 1992; Ames and Archer, 1988). Additionally, motivational climate reflects the perception of how students perceive the structure of the achievement environment. Typically motivational climate has been divided into two perspectives which are task- and ego-involving climates (Ames, 1992; Ames and Archer, 1988). In task-involving climate, students are rewarded and encouraged for trying, learning, effort, co-operation, own development, and setting personal goals (Ames, 1992). In ego-involving climate, activities address performance outcomes and social or normative comparison between students (Ames, 1992). Previous studies in PE have demonstrated that task-involving climate is positively linked with enjoyment whereas no association has been found between ego-involving motivational climate and enjoyment (e.g., Gråstén et al., 2012; Wang et al., 2010).

The SDT suggests that the interaction between individual and social context is the basis for human motivation, behavior, and well-being (Deci and Ryan, 1985, 2000). More specifically, the SDT represents a macro-theory consisting of five mini theories analyzing and explaining the interaction between social environment, motivation, and behavior (Deci and Ryan, 1985, 2000). Mini theories of the SDT include a) the cognitive evaluation theory, b) the organismic integration theory, c) the causality orientations theory d) the basic psychological needs theory, and e) the goal contents theory. In this study we only applied the basic psychological needs (BPN) theory because the main emphasis of this study was to describe students' perceive autonomy, relatedness, and competence, and investigate how these constructs related to enjoyment in PE.

According to the BPN theory, needs for autonomy, competence, and relatedness represent cornerstones of human motivation, well-being, and optimal functioning. More specifically, the SDT suggests that an environment supporting autonomy, competence, and relatedness leads to positive cognitive, affective and behavioral responses, such as enjoyment. On the contrary, environment which thwarts the three psychological needs influences negatively on these outcomes. PE represents an example context in which the three psychological needs exist. Previous research has shown that the role of motivational climate in satisfying the psychological needs is an important determinant of PE enjoyment (Ommundsen and Eikanger-

Kvalø, 2007; Standage et al., 2005).

More specifically, perceived autonomy is determined as a person's urge to be causal agent of one's own life and act in harmony with one's integrated self (deCharms, 1968). Perception of autonomy in PE has been found to be related with enjoyment (Cox et al., 2008; Ommundsen and Eikanger-Kvalø, 2007). Social relatedness is based on the natural need to be connected to, to interact, and to experience caring for others (Baumeister and Leary, 1995). It has also been reported to be associated with enjoyment in PE (Cox et al., 2008; 2009). Subsequently, perceived competence is related to an individual's aspiration to control the outcome and experience mastery perceptions when interacting with the social environment (White, 1959). According to previous research, fulfillment of competence leads to enhanced PE enjoyment (Cox et al., 2008; Ommundsen and Eikanger-Kvalø, 2007).

Only in a few studies, the AGT and the SDT have been integrated to attain more thorough framework to analyze students' motivation in PE (e.g., Ciani et al., 2011; Ommundsen and Eikanger-Kvalø, 2007). The main difference between the AGT and the SDT is that according to the AGT, demonstrating competence is the main motive of human behavior, whereas the SDT suggests that along with competence, also autonomy and relatedness represent important cornerstones of behavior, motivation and well-being. Additionally, competence, autonomy, and relatedness in the SDT represent psychological needs (Deci and Ryan, 1985, 2000), whereas task- and ego-involving motivational climates in the AGT relate to situational psychological perception of the activity that directs the goals of action (Ames, 1992; Nicholls, 1989). However, all these central aspects of both theories can be seen as important motivational constructs of social environment which the teacher contributes by didactical and pedagogical actions when implementing PE. Therefore, this study adopts a framework to analyze PE enjoyment from task- and ego-involving, autonomy, and relatedness climate perspectives.

Several studies have been reported using cluster analytical techniques to investigate students' motivational profiles in PE context. (e.g., Biddle and Wang, 2003; Boiché et al., 2008; Carr, 2007; Ntoumanis, 2002; Wang et al., 2002). However, we found only one study having investigated students' perceptions of motivational climate in PE using cluster analytic techniques (Wang et al., 2010). In their study Wang et al (2010) found a group of students perceiving high task- and high ego-involvement in the climate and a group perceiving both climates low. However, it should be noticed that Wang et al (2010) investigated only students' perceptions of task- and ego-involving climate. This study extends Wang et al. (2010) study by including autonomy and social relatedness supporting climates created by PE teacher along with task- and ego-involving climates in latent profile analyses. We believe that this extension gives better understanding about what type of clusters related to students' perceptions of motivational climate exist in PE and which dimensions of motivational climate are associated more strongly with students' enjoyment than others. Therefore,

the first aim of this study was to identify groups of students with homogenous profiles in perceptions of task- and ego-involving, autonomy, and relatedness supporting climate. Additionally, to our knowledge there are no previous studies investigating how profiles related to students' perceptions of motivational climate differ in the level of enjoyment in PE. Thus, the second aim of this study was to investigate whether different motivational climate groups differ in their enjoyment in PE. This information is supposed to reveal important knowledge which PE teachers may utilize in their pedagogical practices to contribute enjoyment when implementing PE classes. We also investigated differences in enjoyment using gender and cluster groups as independent variables. It needs to be recognized that we have already published one article from the same data set (Soini et al., 2014). It included analyses of psychometrical properties of Motivational Climate in Physical Education Scale.

Methods

Participants
Participants of this study included 4397 Finnish Grade 9 students. The data was drawn from 62 schools (268 PE classes) and it involved 2594 girls and 1803 boys. Participants were recruited by contacting teachers through e-mail list of Finnish PE teachers' association. Altogether 119 PE teachers were willing to participate in the study. The questionnaire was administered to students prior to PE classes by the PE teacher. Participating in the study was voluntary. Students were also told that their responses would be kept confidential. Students were also told to ask for help if confused concerning either the instructions or the clarity of a particular item. No confusion was reported during data collection. The ethical committee of the local University gave permission to this study.

Measures
Motivational Climate in Physical Education Scale (MCPES; Soini et al., 2014): Motivational climate was measured by using the original Finnish version of the MCPES. The scale consists of four subscales comprising autonomy climate, task- and ego-involving climate and social relatedness climate. Autonomy climate dimension includes five items (e.g. 'Students are given the opportunity to select activities according to their own interests'), task-involving climate dimension five items (e.g. 'It is important for the students to try their best during PE lessons'), ego-involving dimension four items (e.g. 'It is important for the students to show that they are better in PE than others'), and social relatedness climate dimension four items (e.g. 'During PE lessons the students pull together'). The MCPES had the individual item stem of "During physical education classes". Each item was rated on a five-point Likert scale (1 = strongly disagree … 5 = strongly agree). Previous research has demonstrated satisfactory reliability and validity for the MCPES in Finnish physical education (Soini et al., 2014). Soini et al's (2014) in their study conducted confirmatory factor analysis and recognized that the MCPES fitted the data well ([χ^2/df] = 6.883; RMSEA .037; NFI = 0.97; CFI = 0.97; and TLI =

0.97). Additionally, Cronbach's alpha coefficients were above .70 indicating satisfactory internal consistency of the MCPES.

Enjoyment. Enjoyment in PE was analyzed by the Finnish version of the Sport Enjoyment Scale (Scanlan et al., 1993). The measure which has the individual item stem of "In my PE classes…". The Sport Enjoyment Scale includes four items (e.g., "I enjoy PE classes") and are rated on a five-point Likert scale (1= strongly agree… 5 = strongly disagree). Previously, the Finnish version of the Sport Enjoyment Scale has been found to be a reliable and valid tool to collect Grade 8 students' enjoyment during physical education classes (Kalaja et al., 2010).

Data analysis

Descriptive statistics and the Pearson product-moment correlations of the main variables were tabulated. Gender differences for four motivational climate dimensions and enjoyment were determined using a one-way Multivariate Analysis of Variance (MANOVA). These analyses were conducted by using IBM SPSS Statistics for Windows, Version 22 (2013 SPSS Inc.; IBM Corp.; Armonk, NY).

In the first part of the main analysis, a latent profile analysis was conducted using the means of the four climate measures (autonomy, relatedness, task, and ego) by Mplus 7.0 (Muthén and Muthén, 2012). The algorithm used was integration and the number of initial stage random starts at 1000 with 20 stages of final stage optimizations. The maximum number of iterations was 500. The estimator used was MLR. We examined the fit of the solutions from one to eight clusters.

Four indices were used in deciding the best solution for the number of clusters: Akaike's Information Criterion or AIC (Akaike, 1987), Bayesian Information Criterion (BIC; Schwartz, 1978), sample-size adjusted BIC (SSA-BIC; Sclove, 1987), and Lo-Mendell-Rubin likelihood ratio test (LMR). These are the commonly used criteria to guide the decision of number of profiles in LPA (Nylund et al., 2007). Lower values of first three indices are indicators of better model fit. Sclove (1987) suggested an adjustment for BIC to reduce the sample size penalty but to a lesser extent compared to the BIC. The LMR test (Lo et al., 2001) is used to compare the estimated model with a model with one less class than the estimated model. A small p-value associated with the LMR test supports the retention of a more complex solution with k clusters (Pastor et al., 2007).

We also examined the models with number of group with less than 1% and less than 5% of the cases.

Solutions with small number of cases may not be meaningful with large sample size in the current study, therefore, only clusters with more than 5% of the cases will be considered as adequate (Marsh et al., 2009).

After the best solution had been determined, the cluster profiles were plotted using line graph, and a detailed description of each cluster was provided. To examine the characteristics of each goal profile cluster according to the reported enjoyment level in PE, a two-way ANOVA was conducted with the cluster and gender as independent variables and enjoyment level as the dependent variable. Post-hoc Tukey tests (Tukey, 1949) were conducted to examine the pairwise comparisons of the clusters. This was to test the predictive validity of the clusters.

Results

Means and standard deviations of the main variables for overall sample, as well as for males and females are shown in Table 1. Generally, students perceived a high task-involving climate, relatively positive relatedness, moderate ego-involving and autonomy climate, and they scored high in PE enjoyment. In terms of correlations, autonomy climate was positively associated with relatedness, task-involving climate, and enjoyment. Relatedness was also positively related to task climate and enjoyment. Task climate was positively related to enjoyment. Ego-involving climate was not associated with autonomy, task, and enjoyment, and had a negative association with relatedness. Intercorrelations of the study variables are presented in Table 1.

The results of the one-way MANOVA showed that there were significant gender differences, (Wilks' Lambda $\Lambda = 0.91$, F (5, 4387) = 87.81, p < 0.001, $\eta^2 = 0.09$). Follow-up ANOVA showed that male students reported higher autonomy, relatedness, ego-involvement, as well as higher enjoyment, compared to female students. No gender differences were found in perceptions of task-involving climate.

Profiles of latent profile groups

The results of the LPA are presented in Table 2. The AIC, BIC, and SSA-BIC decreased as the number of groups increased, but only marginally from more than five group-solutions onward. The *p* values of the LMR for K versus K-1 classes were also significant for each higher group, except for six- and eight-group solutions. In other words, the six-group solution is not significantly better than the five-group solution, and the eight-group solution was not

Table 1. Correlations, Cronbach's alpha coefficients, and descriptive statistics for the overall sample, and for males and females.

	1.	2.	3.	4.	Overall (n=4 394) Mean	SD	Male (n=1 802) Mean	SD	Female (n=2 591) Mean	SD	Gender Differences F	p	η2	Alpha
1.Autonomy	---				2.96	.83	3.02	.83	2.91	.83	19.15	.001	.01	.85
2.Relatedness	.41**	---			3.16	.89	3.23	.87	3.11	.90	19.96	.001	.01	.88
3.Task	.36**	.47**	---		3.95	.74	3.93	.77	3.96	.71	2.23	.135	.00	.80
4.Ego	.06**	-.12**	.02	---	3.02	.82	3.24	.76	2.86	.82	231.33	.001	.05	.78
5.Enjoyment	.39**	.50**	.63**	.01	3.79	1.01	3.95	.95	3.68	1.04	76.18	.001	.02	.93

* p < 0.05; ** p < 0.01

Table 2. AICs, BICs and sample-size adjusted BICs values for different model parameterizations.

No. Group	No. Parameter	AIC	BIC	SSA-BIC	pLMR	Group Sizes LT1%	LT5%
1	8	42778	42829	42803	---	0	0
2	13	41095	41178	41136	.001	0	0
3	18	40569	40684	40627	.001	0	0
4	23	40414	40561	40488	.001	0	1
5	28	40236	40415	40326	.010	0	1
6	33	40124	40334	40230	.210	0	1
7	38	40016	40259	40138	.030	0	3
8	43	39948	40223	40086	.071	2	3

better than the seven-group solution. Based on all considerations, a five-group solution was considered most suitable. Means and standard deviations of the main variables by cluster are presented in Table 3.

Figure 1 shows the graphical latent profiles for the five-cluster solution. Additionally, Figure 1 demonstrates graphically the level enjoyment for each cluster. The first cluster or profile can be labelled as 'low autonomy, relatedness, task, and moderate ego climate' group. This group of students perceived low autonomy, relatedness, and task climate in their PE classes and with moderate ego climate. There are 181 students (105 girls and 76 boys) accounted for 4.12% of the sample.

Cluster 2 represented 8.6% of all students (n = 377; 116 boys, 261 girls) was labelled 'low autonomy, relatedness, and high task and ego climate' group. This cluster comprised of students who perceived low autonomy and relatedness climate but high task climate with a relatively high ego climate.

Cluster 3 (n = 889; 360 boys, 529 girls) was labelled 'moderate autonomy, relatedness, task and ego climate' group. This cluster comprised students who had moderate scores on perceptions of autonomy, relatedness, task and ego climate. This group made up of 20.2% of the total sample.

Cluster 4 (n = 679; 281 boys, 391 girls) was labelled 'high autonomy, relatedness, task, and moderate ego climate' group. There was 15.4% of the entire sample with this profile. This cluster comprised of students who had highest scores in autonomy, relatedness, and task climate with lowest score in ego climate.

The last cluster was labelled as the 'high relatedness and task but moderate autonomy and ego climate' group, comprising of 2 268 students (51.6%) who perceived predominantly high task and low ego climate. There are 1 305 girls and 963 boys in this group.

The results of the two-way ANOVA with gender and cluster group showed that there were significant differences among the groups in enjoyment for gender [F (1, 4383) = 71.86, $p < 0.01$, $\eta^2 = 0.02$] and cluster [F (4, 4383) = 704.98, $p < 0.01$, $\eta^2 = 0.39$], as well as interac-

tion effects [(F (4, 4383) = 3.52, $p < 0.01$, $\eta^2 = 0.01$). However, the interaction effects between gender and group were very small (see Figure 2), the differences between boys and girls in enjoyment seem to be less pronounced for Clusters 4 and 5, compared to the other three clusters. The results of the post-hoc Tukey tests found that all the pair-wise comparisons were significant (all ps < 0.001).

Discussion

The aim of this study was twofold. We first aimed to identify groups of students with homogenous profiles in perceptions of task- and ego-involving, autonomy, and social relatedness supporting climate. Secondly, we investigated whether different motivational climate groups differed in their level of enjoyment in PE. Latent profile analyses revealed the five-cluster solution to be the best solution. Half of the students in this relatively large sample belonged to the cluster having high perception of task- and relatedness but moderate perception of ego-involving climate. Additionally, descriptive statistics demonstrate that this group of students perceived PE classes enjoyable. Considering the finding that 15 % of the sample belonged to even more positive motivational cluster, we may consider Finnish secondary school physical education producing positive motivational and affective perceptions for the most of the students. In Finland all students in PE teachers training program go through five years Master level studies, one of the main aims of which is to learn principles of creating task-involving motivational climate using the framework of the TARGET –model (Epstein, 1989).

Our results support previous empirical evidence demonstrating that high perception of task-involving, autonomy, and relatedness climates are generally associated with high enjoyment (Cox et al., 2008; 2009; Ommundsen and Eikanger-Kvalø, 2007). Additionally, the finding that lowest levels of enjoyment were observed within clusters in which the students had low perceptions of task-involving, autonomy, and relatedness climates is

Table 3. Means and standard deviations (SD) of the main variables by cluster.

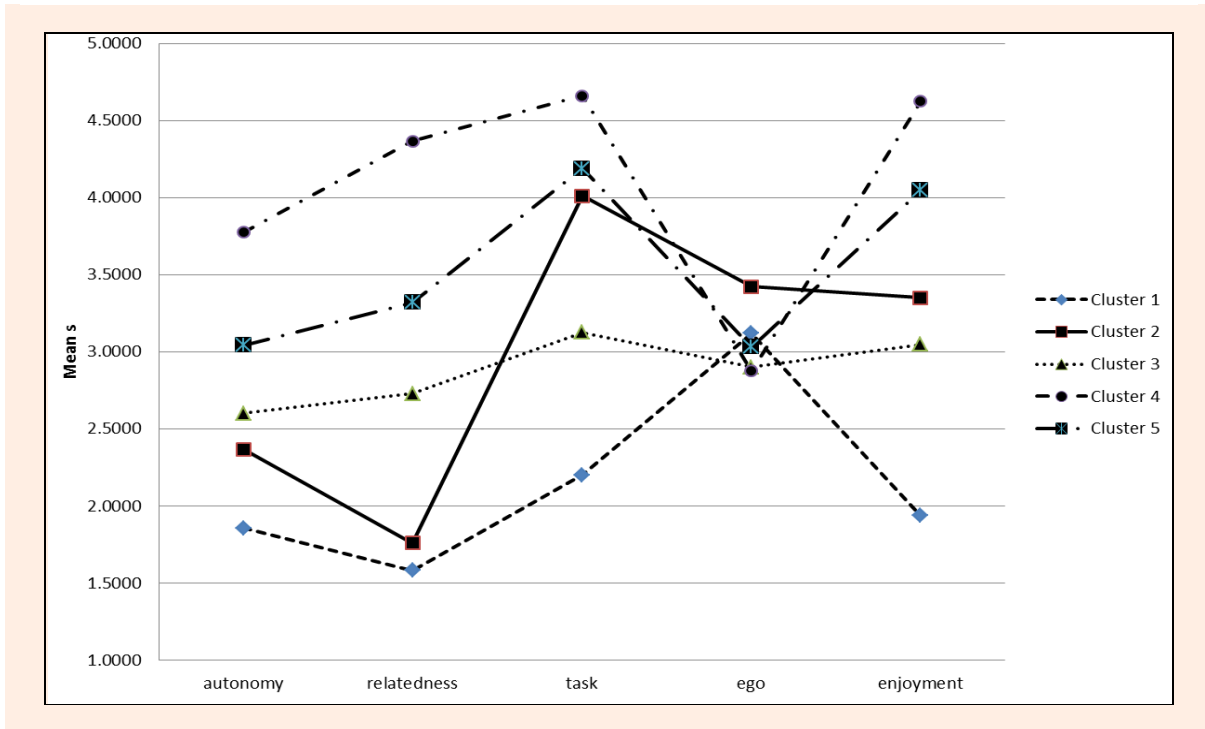| Variable	Cluster 1 (N = 181) Mean	SD	Cluster 2 (N = 377) Mean	SD	Cluster 3 (N = 889) Mean	SD	Cluster 4 (N = 679) Mean	SD	Cluster 5 (N = 2268) Mean	SD
Autonomy	1.86	.74	2.37	.80	2.60	.67	3.78	.67	3.04	.68
Relatedness	1.58	.53	1.76	.43	2.73	.49	4.36	.43	3.32	.51
Task	2.20	.59	4.01	.46	3.13	.38	4.66	.35	4.19	.42
Ego	3.12	1.09	3.42	.88	2.90	.69	2.87	.96	3.03	.76
Enjoyment	1.94	.97	3.35	1.03	3.05	.87	4.63	.53	4.05	.75

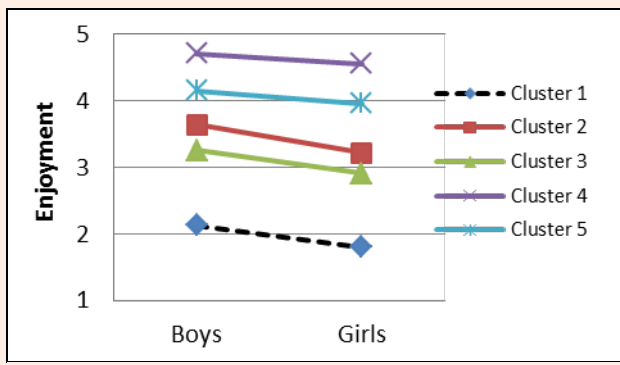**Figure 1. Cluster profiles of the five clusters.**

Figure 2. Mean scores of enjoyment of the five clusters by cluster groups

in line with the previous empirical findings (Cox et al., 2008; Nicholls, 1989; Deci and Ryan, 1985; 2000).

Additionally, our results are consistent with theoretical assumptions of the achievement goal theory (Nicholls, 1989) and the self-determination theory (Deci and Ryan, 1985; 2000). More specifically, results indicated that students who perceived PE climate emphasizing effort, learning and own development experienced high enjoyment. This finding is in line with the achievement goal theory suggesting that task-involving motivational climate of an action leads to positive affective responses (Ames, 1992; Ames and Archer, 1988; Nicholls, 1989). Similarly, students who perceived their PE class involving possibilities for freedom of own actions and interaction with other students experienced higher enjoyment. These principles of autonomy and relatedness are key constructs of the self-determination theory suggesting that these perceptions lead to positive affect (Deci and Ryan, 1985; 2000). The only theoretically unexpected results

was found in a small cluster 2 in which students had relatively low perception of autonomy and relatedness climates but experienced rather high level of enjoyment.

Task-involving climate in this study was more crucial for students' enjoyment than any other climate dimension. When students perceived task-involving climate high, their enjoyment was also high. The only exception was cluster 2 in which students had high perception of task-involving climate but moderate level of enjoyment. However, the perception of enjoyment in this group was clearly higher than in clusters one and three in which students perceived lower task-involving climate. Additionally, students who perceived lowest levels of task-involving climate also enjoyed least in PE classes. The remarkable association between task-involving climate and students' enjoyment indicates that self-referenced learning climate was more important than students' perception of autonomy or social relatedness in this sample of Finnish secondary school students.

Cluster one was the only group to have lower perception of task- than ego-involving climate. Descriptive statistics showed that this group also perceived lowest level of enjoyment in this sample. This result support findings of previous studies showing that climate involving performance outcomes and social comparison between students does not hinder students' motivation if they perceive higher task-involving climate at the same time (Standage et al., 2003). This finding suggests PE teacher should confirm that his/her teaching includes more task- than ego-involving elements.

Finnish Grade 9 students perceived lower level of autonomy climate than task-involving or relatedness climate in this sample. This finding may reflect the fact that Finnish PE curriculum is determined by the Finnish National Board of Education. This means that many activi-

ties in PE are determined by PE curriculum and PE teachers are advised to implement them. This may reduce teachers' possibilities to support students' autonomy as much as they may contribute task-involvement or relatedness. However, this study indicated that autonomy significantly correlated with enjoyment in PE. Subsequently, previous studies have demonstrated this association (Cox et al., 2008; Ommundsen and Eikanger-Kvalø, 2007). Based on these findings we might suggest that Finnish PE teachers need to put special effort giving students more autonomy support by, for example, by taking them in decision making, giving them freedom to make choices, and giving them opportunities to affect the way PE lessons are conducted.

There was plenty of variation in perceptions of relatedness climate between the five clusters. Students in clusters 4 and 5 perceived relatively high levels of relatedness in PE whereas students in clusters1 and 2 had very low perceptions of relatedness. This finding may suggest that there would be a need to include more teaching methods which contribute working and pulling together as a group, cohesion during classes, and unity of the class in Finnish PE. For example, Mosston and Ashworth's (2002) spectrum of teaching styles suggest that practice and reciprocal teaching styles are effective pedagogical methods to contribute students pulling together in PE classes.

Boys scored significantly higher than girls in all other study variables except task-involving climate. However, all significant gender differences except difference in ego-involving motivational climate were small in their effect. Aforementioned gender differences were in line with previous research showing that the boys perceive higher levels of ego-involving climate and enjoy in PE more than the girls in Finnish PE (Jaakkola et al., 2013) but are inconsistent with the previous finding that girls perceive higher task-involving motivational climate in Finnish secondary school (Jaakkola et al., 2013). The investigation of enjoyment within different clusters also revealed that the boys enjoyed more than the girls in all clusters. These findings imply that especially in girls' PE there is a need to increase enjoyment.

The limitation of this study is the cross-sectional nature of the data collection which does not allow us to make causal conclusions. Additionally, although the sample was rather large, it included only Grade 9 students. Given the nature of the data could be nested with a multilevel structure (such as class, teacher, school), future studies need to address this issue with multilevel analyses. In future it would be interesting to implement interventions to develop different dimensions of motivational climate. Additionally, follow- up studies should be established to analyze how students' perceptions of motivational climate influence their level of enjoyment in PE.

Conclusion

The results of this study revealed that students perception of motivational climate in PE differ considerably. It is also remarkable that these perceptions are associated with different levels of PE enjoyment. It seems that task-

involving climate is the most important factor related to enjoyment in PE. Teachers should emphasize effort, own development, learning and co-operation to promote students positive affect in PE.

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Key points

- Latent profile analyses produced a five-cluster solution labeled 1) 'low autonomy, relatedness, task, and moderate ego climate' group', 2) 'low autonomy, relatedness, and high task and ego climate, 3) 'moderate autonomy, relatedness, task and ego climate' group 4) 'high autonomy, relatedness, task, and moderate ego climate' group, and 5) 'high relatedness and task but moderate autonomy and ego climate' group.

- Analyses of variance showed that clusters 4 and 5 perceived the highest level of enjoyment whereas cluster 1 experienced the lowest level of enjoyment. The results showed that the students' perceptions of motivational climate create differential levels of enjoyment in PE classes.

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