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PEDAGOGY

Analyzing the Contribution of Student-Perceived Motivational Climate to Predict Student Goal Adoption in Physical Education: Testing Invariance Relative to Teacher-Induced Climate

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Abstract

Based on achievement goal theory, this study aimed to verify if relationships between student-perceived motivational climate and student achievement goals differ by teacher-induced climates in physical education (PE). A sample of 651 French Canadian students and 23 PE teachers (categorized in three clusters) completed self-report questionnaires. To verify if the climate–goals relationships differ according to the teacher-induced climate, this study conducted a multigroup invariance analysis. The results revealed full invariance across groups for means and intercepts. However, only partial invariance was observed for variance, covariances, structural weights, and residuals, indicating that, despite disparities between students'

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and teachers' perceptions, the teacher-induced climate seems to play a role in students' goal adoption in PE. This study refines current understanding of the climate–goals relationship by considering the teachers' perspective of their practices in PE. Practical implications are discussed.

In the domain of health education, antecedent research demonstrates the multiple benefits of an active lifestyle during youth (Janssen & LeBlanc, 2010). Despite such evidence, adolescence in Canada is a stage of development where sedentary behavior increases, which results in a high proportion of insufficiently active people (Tremblay et al., 2010). Physical education (PE) represents an opportunity for teachers to enhance adolescents' awareness of the benefits of being active, as well as of their physical activity behavior. In this regard, it is plausible that high levels of motivation and engagement in PE are factors associated with an active lifestyle outside of school (Cox, Smith, & Williams, 2008).

Achievement goal theory (AGT; Ames & Archer, 1988) posits interplay between the classroom environment established by teachers and its influence on students' motivation, attitudes, and behaviors. Sarrazin, Tessier, and Trouilloud (2006) define motivational climate as "the learning environment that can influence students' goals and motivation" (p. 149). Moreover, goals adopted in PE can influence students' attitudes toward physical activity, as well as their level of physical activity behaviors (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012). Therefore, this study examined how motivational climate determines students' achievement goals, while simultaneously considering teachers' and students' perceptions. Recently, Trouilloud (2015) concluded that considering both measures of motivational climate was important for refining the understanding of the relationships between motivational climate and motivational processes in PE. To researchers' knowledge, few data are available regarding relationships between teachers' and students' perceptions of motivational climate, and it seems that they do not always correspond (Trouilloud, 2015). In practical terms, it is conceivable that teachers' pedagogical practices, when not adequately perceived by their students, may be less optimal for their motivation.

Achievement Goal Theory

The trichotomous model of AGT holds that people can pursue three types of goals when engaging in an activity[1]: (1) mastery, (2) performance-approach, and (3) performance-avoidance (Elliot & Church, 1997). People assess their competence according to individual criteria when aiming for mastery goals. When pursuing mastery goal orientation, individuals aim to progress as much as possible to improve their abilities. Confronted by realistic challenges, they will make efforts and persevere. In contrast, when adopting performance goals, people assess their competence in comparison to others or to normative standards. If they think they can outperform others, they tend to adopt performance-approach goals. On the other hand, if they feel less capable than others, they may want to protect themselves from failure by pursuing performance-avoidance goals.

Mastery and performance-approach goals are associated with high feelings of competence[2] and are qualified as *approach* goals because individuals seeking them are oriented toward success (Elliot, 1999). Consequently, approach goals come with positive consequences such as effort and enjoyment. However, performance-approach goals can also generate unfavorable consequences such as anxiety and negative attitudes toward an activity (Papaioannou et al., 2012). On the other hand, individuals adopting performance-avoidance goals are oriented toward the fear of being surpassed by other students. Thus, they often feel less competent and are more inclined to be afraid to fail in an activity, resulting in the adoption of performance-avoidance strategies (Elliot, 1999). Accordingly, in comparison to the pursuit of approach goals, pursuing performance-avoidance goals can be detrimental to students' motivation and engagement in PE (Papaioannou et al., 2012).

[1]AGT researchers have suggested other taxonomies of achievement goals (from 2 to 6: see Elliot, 1999). However, some of these goals (e.g., mastery-avoidance) are still being questioned by some and are less likely to be understood by young high school students (Garn, Ware, & Solmon, 2011). For these reasons, they were not included in this study.

[2]The overall judgment that an individual has of him- or herself relative to a given field of activity (Harter & Connell, 1984).

Motivational Climate in PE

Consistent with achievement goals, motivational climate can be defined in terms of mastery, performance-approach, and performance-avoidance (Papaioannou, Milosis, Kosmidou, & Tsigilis, 2007). When teachers emphasize effort and individual progression, a mastery motivational climate usually occurs. When teachers put forward a performance-approach climate, more attention is paid to competition between students and the importance of outperforming others. In a performance-avoidance climate, teachers also encourage competition between students and compare them for ability level. The difference with a performance-approach climate is that teachers convey the message to students that it is important that they avoid being less capable than their classmates (Papaioannou et al., 2007). Those types of climates are not mutually exclusive, meaning that a teacher may foster a mastery climate while adopting teaching approaches that could nurture performance-approach or -avoidance climates. For example, a teacher could encourage a student to put a lot of effort in a running task by saying things like "Just a little faster, I know you can do it!" (mastery climate) while comparing the student to others who are better than him or her: "This time, I don't want you to finish last!" (performance-avoidance climate).

Even though PE teachers intend to establish a motivational climate, students might interpret their teaching practices otherwise. In fact, depending on each student's expectations and previous experiences (Maehr, 1984), the motivational climate might differentially affect the student's cognition, behaviors, and performance (Fontayne & Bohuon, 2011). For these reasons, Ames (1992) recommended the measurement of students' perceptions of motivational climate. Consequently, most antecedent AGT research considered students' perception of motivational climate uniquely (Harwood, Keegan, Smith, & Raine, 2015). In antecedent research using AGT framework, two studies explored congruency between the two climate measures: one in sport and one in PE (Boyce, Gano-Overway, & Campbell, 2009; Morgan, Sproule, Weigand, & Carpenter, 2005). Moreover, these studies did not contemplate both subdimensions of the performance climate (approach and avoidance).

According to AGT, students tend to adopt goals that are in accordance with the motivational climate they perceive, which

suggests that climate determines students' goal adoption. For example, as the literature shows, the mastery climate influences students to adopt mastery goals in PE (Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010; Girard, Chouinard, & St-Amand, 2015; Halvari, Skjesol, & Bagøien, 2011; Wang, Liu, Chatzisarantis, & Lim, 2010). Climate–goals relationships involving other dimensions are less consistent, as is the predictive value of the performance motivational climate on performance goals (approach and avoidance). For example, the mastery motivational climate sometimes displays a positive relationship with performance-approach goals (Ommundsen, 2006) and a negative relationship with performance-avoidance goals (Erturan-İlker & Demirhan, 2012). Nevertheless, it seems that these relationships are not always significant (Papaioannou et al., 2007). Moreover, the negative relationship between the perception of a performance-avoidance climate and the adoption of mastery goals (Erturan-İlker & Demirhan, 2012) is not always significant (Girard et al., 2015). As another example, some researchers have observed that performance-avoidance goals may be predicted by the perception of a performance-approach climate (Papaioannou et al., 2007), whereas others have demonstrated that performance-avoidance goals are determined by a performance-avoidance climate (Erturan-İlker & Demirhan, 2012). Based on such mixed results, it is plausible that these relationships might be affected by a teacher-induced climate.

Few studies have made the *approach–avoidance* distinction with performance motivational climate in PE (Erturan-İlker, 2014; Erturan-İlker & Demirhan, 2012; Girard et al., 2015; Papaioannou et al., 2007). By splitting the performance climate into approach and avoidance dimensions, this study contributes to a better understanding of climate–goals relationships, which are of particular importance for high school PE teachers who want to enhance students' motivation. Indeed, it seems that high school PE teachers in the province of Quebec are more inclined to establish a performance motivational climate than are their colleagues from elementary schools (Baril, Paquette, & Ouimet, 2014). This reality also occurs in other countries (Barkoukis et al., 2010; Spray, Warburton, & Stebbings, 2013).

In line with Trouilloud's (2015) argument that studies would benefit to consider both students' and teachers' perceptions of the motivational climate, this study aims (1) to verify

if the student-perceived motivational climate varies according to teacher-induced motivational climates and (2) to verify the invariance of the climate–goals relationships according to these teacher-induced motivational climates.

Method

Participants and Procedures

The sample consists of 651 students (72% middle school, n_{girls} = 284, n_{boys} = 176, $n_{unknown}$ = 8; 28% high school, n_{girls} = 125, n_{boys} = 55, $n_{unknown}$ = 3) and 23 PE teachers (70% middle school, 4 females; 30% high school) from 11 public high schools located in an urban region (Montreal, Canada). Participants from regular PE classes were included in the study. A regular PE school program comprises 50 hr allocated to mandatory physical education per school year, repartitioned on 180 days from the end of August to the end of June. After ethics approval was received for this study, permission was granted by school boards and principals. PE teachers, students, and parents assented by signing a consent form. Because we wanted to make sure that the motivational climate was well established in all PE classes, we collected data at the end of the school year (in May). One research member collected all data with questionnaires during the first 15 min of PE classes. Teachers and students completed the questionnaires at the same time (teachers were separated from students). We informed all participants about the confidentiality of their answers, to limit possible response bias. Moreover, we advised teachers to answer according to their current pedagogical practices.

Measures

We measured three constructs: teacher-induced motivational climate, student-perceived motivational climate, and students' achievement goals in PE. Because the scales were in English, we had an English-French translator perform translation of the questionnaires. Then, with the French items, we analyzed psychometric properties of each scale and calculated composite score (mean score for items representing a factor) for each variable.

We measured the teacher-induced motivational climate with a modified, teacher-adapted version of the Perceptions of a Physical Education Teacher's Emphasis on Achievement Goals Questionnaire

(Papaioannou et al., 2007). This questionnaire assesses three motivational climates: mastery, performance-approach, and performance-avoidance. Antecedent research supported acceptable construct validity of this instrument in high school PE (Papaioannou et al., 2007). Participants indicated their level of agreement with each sentence on a 5-point Likert scale from 1 (*totally disagree*) to 5 (*totally agree*). For the mastery climate (4 items), participants (e.g., teachers) responded to items such as "In my physical education classes, I am very satisfied when someone shows improvement after a hard effort." For the performance-approach climate (5 items), teachers indicated their level of agreement with items such as "In my PE classes, I am absolutely satisfied with students who performed better than others." Finally, we measured the performance-avoidance climate (4 items) with items such as "In my PE classes, I made students avoid skills and games in which their abilities could be criticized." We assessed reliability by calculating Cronbach's alpha, which resulted in acceptable values in two of the three scales ($\alpha_{mastery} = .80$; $\alpha_{perf\text{-}app} = .70$). The performance-avoidance climate scale was non-optimal ($\alpha_{perf\text{-}avoid} = .61$), and interpretation of this variable will be cautious. We analyzed the composite score for each factor, which resulted in three factor scores: mastery, performance-approach, and performance-avoidance.

We assessed the student-perceived motivational climate in PE with the Perceptions of Physical Education Teacher's Emphasis on Achievement Goals Questionnaire (Papaioannou et al., 2007). Students' perceptions of the PE motivational climate were measured in the same way as the procedure described in the teacher-induced motivational climate. For students' perceived mastery climate (5 items, 1 [*totally disagree*] to 5 [*totally agree*]), participants (i.e., students) responded to questions such as "This year, in my PE classes, my teacher is very satisfied when someone is showing improvement after hard effort." We measured the performance-approach climate with four items such as "This year, in my PE classes, my teacher was absolutely satisfied with students who performed better than others." We measured the performance-avoidance climate with four items such as "This year, in my PE classes, my teacher made me avoid skills and games in which my abilities could be criticized." Psychometric properties were similar for students' scales: $\alpha_{mastery} = .81$, $\alpha_{perf\text{-}app} = .72$,

and $\alpha_{perf\text{-}avoid}$ = .66. We also calculated composite scores for further analyses.

We assessed students' achievement goals in PE with the Achievement Goal Scale (AGS; Papaioannou et al., 2007). Each AGS item was measured on a 5-point Likert-type scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). We gauged mastery goals with five items such as "In my PE classes, my goal is to improve my skills." For performance-approach goals, students responded to five items such as "In my PE classes, my goal is to overcome others in drills and games." Finally, we measured performance-avoidance goals with four items such as "In my PE classes, my goal was to avoid drills and games in which I may be gibed for my abilities." Psychometric properties were similar with what was observed with the perceived climate questionnaires: $\alpha_{mastery}$ = .83, $\alpha_{perf\text{-}app}$ = .82, and $\alpha_{perf\text{-}avoid}$ = .62. We calculated composite scores for further study analyses.

Statistical Analyses

We performed all statistical analyses using SPSS and AMOS 23 software. Due to the low proportion of missing data (none for teachers' items; 0.3%–2.9% for students' items), we did not apply imputation procedures prior to performing item parceling (calculating mean score between corresponding items) on each factor. We also tested data for multicollinearity. In this case, tolerance was above .2 and *variance inflation factor* (VIF) was below 1, indicating no multicollinearity (Kline, 2011).

As a first step of our analyses, we identified the different combinations of teacher-induced motivational climates among our sample. To do so, we conducted cluster analyses by using the "K-means" method. This procedure resulted in three teacher-induced motivational climate clusters: (1) "mastery/performance-avoidance" (Group 1: n = 4), (2) "mastery/performance-approach" (Group 2: n = 10), and (3) "mastery" (Group 3: n = 9). Subsequently, a one-way ANOVA showed that the teacher-induced mastery climate was not significantly different among the three groups, $F(20, 2) = 0.73$, $p > 0.5$. However, we observed significant group differences on the teacher-induced performance-approach, $F_{perf\text{-}app}(20, 2) = 14.27$, $p < 0.01$, and the performance-avoidance climate measures, $F_{perf\text{-}avoid}(20, 2) = 28.80$, $p < .01$. Then, to verify if the teacher-induced climate differed from the student-perceived motivational climate

in each cluster, we conducted independent *t* tests. For the second aim of the study, we performed multigroup path analysis invariance using maximum likelihood (ML) estimation (see the tested model, Figure 1).

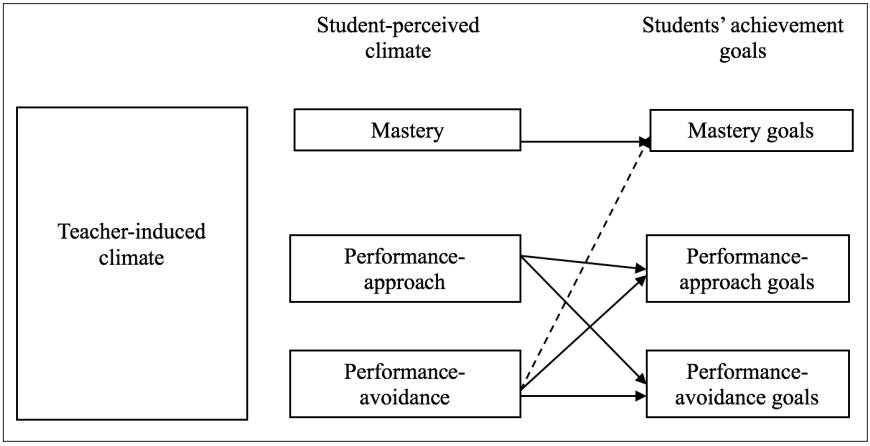

Figure 1. The hypothesized model: Relationships between teacher-induced climate, student-perceived climate, and students' achievement goal adoption. Dashed lines represent hypothetical, negative relationships between these two constructs.

We tested full parameter invariance across the groups by following these steps: (1) factor means, (2) covariances, (3) structural weights, and (4) structural residuals. Factor means represent the mean score for each factor. Covariances correspond to the relationships between each factor. Structural weights are the factor loadings explaining relationships between predictors and outcomes, and structural residuals are the error terms associated with each factor. At each step, if the chi-square difference test ($\Delta\chi^2$) was significant, we released the constraints one by one to identify which one was not invariant across groups (Byrne, 2010). After releasing those specific constraints, we compared the "partially" invariant model to the previous reference model. If the increase in chi-square was nonsignificant, we then analyzed the next step.

We used different fit indices to interpret model parameters. The chi-square statistic (χ^2) should be nonsignificant, the comparative fit index (CFI) should be above .95, and finally, the root mean square error of approximation (RMSEA) should be below

.06 while providing a narrow confidence interval (low 90–high 90) with probability higher than .50 (Hu & Bentler, 1999; Jöreskog & Sörbom, 1996). We also examined the standardized residual covariance matrix to determine if the model explained the data adequately. Values below 2.58 were acceptable for each standardized residual covariance (Byrne, 2010).

Results

Table 1 presents descriptive statistics relative to each cluster and comparisons between teacher-induced and student-perceived motivational climates. For teacher and student measures, all group comparisons showed significant differences (t varying between 2.06 and 7.89, with $p < .05$), except for performance-approach measures in the mastery/performance-approach climate ($t = .27$, $p > .5$) and performance-avoidance measures in the mastery climate ($t = .20$, $p > .5$). These results suggest the presence of a gap between teachers' and students' perceptions.

Table 1
Descriptive Statistics (Means and Standard Deviations) and Teacher-Induced and Student-Perceived Motivational Climates Comparisons

Measure	Group 1	Group 2	Group 3
Teachers	$N = 4$	$N = 10$	$N = 9$
Mastery	4.88 ± 0.25	4.63 ± 0.58	4.83 ± 0.28
PerfApp	2.00 ± 0.32	2.78 ± 0.43	1.71 ± 0.50
PerfAv	4.25 ± 0.61	2.38 ± 0.40	2.06 ± 0.54
Students	$N = 111$	$N = 290$	$N = 250$
Mastery	4.04 ± 0.81	3.94 ± 0.94	3.98 ± 0.85
PerfApp	2.82 ± 1.00	2.82 ± 1.00	2.70 ± 0.98
PerfAv	1.94 ± 0.25	1.93 ± 0.86	2.00 ± 0.88
Teacher–student comparisons (t tests)	$t_{M} = 2.06^{\star}$ $t_{PAp} = 5.50^{\star}$ $t_{PAv} = 5.50^{\star}$	$t_{M} = 3.60^{\star}$ $t_{PAp} = 0.27$ $t_{PAv} = 3.30^{\star}$	$t_{M} = 7.89^{\star}$ $t_{PAp} = 5.57^{\star}$ $t_{PAv} = 0.20$

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

$^{\star}p < .05$.

Table 2 displays the fit indices for the tested models. The initial model (Model A) resulted in an acceptable fit, $\chi^2 = 24.477$, $p = .018$, RMSEA = .040 (.016–.063, $p = .740$), CFI = .978, SRMR = .059. The second model assessing means and intercepts invariance (Model B) also yielded an acceptable fit, and the chi-square difference was not significant, $\Delta\chi^2(12) = 10.678$, $p > .05$.

The full variances and covariances invariance model (Model C) failed, as the chi-square increased significantly, $\Delta\chi^2(12) = 21.222$, $p < .05$. Releasing the constraint for the covariance between the student-perceived mastery and performance-approach climates in the mastery teacher-induced climate (Model D) yielded a nonsignificant difference compared with the full means and intercepts invariance model (Model B).

The full structural weights invariance model (Model E) failed, as the chi-square increased significantly, $\Delta\chi^2(12) = 27.662$, $p < .05$. Releasing the constraints for (1) the path between the student-perceived performance-approach climate and students' performance-avoidance goals in the mastery/performance-approach teacher-induced climate and (2) the paths between the student-perceived performance-avoidance climate and students' performance (approach and avoidance) goals in the mastery/performance-avoidance teacher-induced climate (Model F) yielded a nonsignificant difference compared with the partial variances and covariances invariance model (Model D).

The full structural residual invariance model (Model G) failed, as the chi-square increased significantly, $\Delta\chi^2(10) = 21.635$, $p < .05$. Releasing the constraint for the students' mastery goal error variance in the mastery/performance-approach teacher-induced climate (Model H) yielded a nonsignificant difference compared with the partial structural weights invariance model (Model F).

Table 3 displays the values of all parameters for the three groups. Where an invariant parameter was observed across all groups, only one value is presented. Where a parameter was invariant across two groups, two values appear. Means, variances, and intercepts were invariant across teacher-induced climate groups, indicating a gap between students' and teachers' perception of the climate. The students' mastery goals error variance was higher in the mastery/performance-approach climate compared to the other two groups.

Table 2
Tests for Multigroup Invariance Across Three Teacher-Induced Motivational Climates in PE

Model		Compared model	χ^2 (*df*)	$\Delta\chi^2$ (*df*)	RMSEA	CFI
A	Baseline model (unconstrained)		24.477 (12)*	-	.040 (.016–.063)	.978
B	Full means and intercepts invariance	A	35.154 (24)	10.678 (12)	.027 (.000–.045)	.980
C	Full variances and covariances invariance	B	56.376 (36)*	21.222 (12)*	.030 (.013–.044)	.964
D	Partial variances and covariances invariance	B	44.703 (35)	9.549 (11)	.021 (.000–.037)	.983
E	Full structural weights invariance	D	72.365 (47)*	27.662 (12)*	.029 (.014–.041)	.956
F	Partial structural weights invariance	D	57.480 (44)	12.662 (9)	.022 (.000–.036)	.976
G	Full structural residual invariance	F	79.115 (54)*	21.635 (10)*	.027 (.012–.039)	.956
H	Partial structural residual invariance	F	69.332 (53)	11.852 (9)	.022 (.000–.035)	.971

Note. Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery; Full invariance = with all constraints; Partial invariance = without some constraints.

*$p < .05$.

Accordingly, in that combination of climate, the model explained less mastery goals variance (R^2 = 20.7%) than in the other groups (R^2 = 27%). Moreover, in the mastery/performance-avoidance climate, the performance-approach goals explained variance (R^2 = 19.1%) was lower than in the other two groups (R^2 = 22.5%), but to a lesser extent. The performance-avoidance goals explained variance varies in each combination of teacher-induced, but remains low (R^2_{group1} = 3.6%; R^2_{group2} = 6.9%; R^2_{group3} = 9%).

Table 4 displays regression weights and covariances for the three groups. Again, where an invariant parameter was observed across all groups, only one value is presented. Where a parameter was invariant across two groups, two values appear. Regression weights between the student-perceived mastery climate and students' mastery goals, as well as between the student-perceived performance-approach climate and students' performance-approach goals, were equal across groups. In line with the low proportion of the performance-avoidance goals explained variance, in the mastery/performance-avoidance climate the student-perceived performance-avoidance climate shows no significant association with students' adoption of performance-avoidance goals. In the other two groups, that relationship was significant. In all groups, the student-perceived performance-avoidance climate determined students' adoption of performance-approach goals, but the relationships were weaker in the mastery/performance-avoidance climate. In contrast with the mastery/performance-avoidance and mastery teacher-induced climate, there was no significant association between the student-perceived performance-approach climate and students' adoption of performance-avoidance goals in the mastery/performance-approach teacher-induced climate. All covariances were equal across groups except for one between the student-perceived mastery and performance-approach climates. In the mastery teacher-induced climate, that association was negative, while it was positive in the other two combinations of motivational climates.

Table 3

Invariant and Non-Invariant Means (Standard Errors), Intercepts, Variances, and Squared Multiple Correlations in Three Teacher-Induced Motivational Climates in PE

	M (*SE*)			Variances (*SE*)			R^2		
Variable	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1 %	Group 2 %	Group 3 %
Mastery climate	3.967 (.034)			.777 (.043)					
PerfApp climate	2.774 (.039)			.985 (.055)					
PerfAv climate	1.959 (.034)			.744 (.041)					
	Intercepts (*SE*)			**Error variances (*SE*)**					
Mastery goals (e2)	1.809 (.174)			.567 (.042)	.800 (.066)	.567 (.042)	27.0	20.7	27.0
PerfApp goals (e3)	.879 (.119)				.886 (.049)		19.1	22.5	22.5
PerfAv goals (e4)	1.988 (.113)				.781 (.043)		3.6	6.9	9.0

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

Table 4
Invariant and Non-Invariant Regression Weights and Covariances in Three Teacher-Induced Motivational Climates in PE

	Regression weights (*SE*)		
Variable	**Group 1**	**Group 2**	**Group 3**
Mastery goals ← Mastery climate	.524 (.036)***		
PerfApp goals ← PerfApp climate	.411 (.040)***		
PerfAv goals ← PerfAv climate	.097 (.058)	.244 (.044)***	
PerfApp goals ← PerfAv climate	.121 (.060)*	.215 (.047)***	
PerfAv goals ← PerfApp climate	.121 (.039)**	.064 (.040)	.121 (.039)**
	Covariances (*SE*)		
PerfApp climate ↔ PerfAv climate	.322 (.036)***		
Mastery climate ↔ PerfAv climate	-.129 (.030)***		
Mastery climate ↔ PerfApp climate	.119 (.042)**		-.109 (.052)*
e3 ↔ e4	.146 (.033)***		
e2 ↔ e3	.117 (.030)***		

Note. PerfApp = performance-approach; PerfAv = performance-avoidance; Group 1 = mastery/performance-avoidance; Group 2 = mastery/performance-approach; Group 3 = mastery.

*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

To our knowledge, this study is one of the few that considers both teachers' and students' perceptions of three types of motivational climates and their implications on students' achievement goals in PE. As expected, results showed that teachers tend to combine different styles of motivational climate in their teaching practice. It is promising that teachers tend to put forward a mastery motivational climate, meaning that they encourage students to make personal progress and to persevere according to their capacity level. Nevertheless, by trying to motivate their pupils, teachers might encourage them to improve and, at the same time, compare them to their classmates. Teachers can express this comparison in two ways: (1) giving students an indication that they should avoid performing below average or worse than their peers (performance-avoidance)

or (2) encouraging students to surpass others and to try to be the best (performance-approach). In fact, these mixed messages suggest that teachers could benefit from a better understanding of how their students interpret these mixed messages and how these might be detrimental to students' motivation.

Significant differences between teacher and student climate measures indicate that students perceive motivational climate differently than their teachers do. Teachers tendency to overestimate their their own skills relate well to what is usually observed in coaching leadership (Solansky, 2010). In fact, teachers may have responded according to what they thought was best practice instead of what they really did in their PE classes, resulting in a social desirability bias (Donaldson & Grant-Vallone, 2002). These results are congruent with previous findings in PE where the performance climate was not conceptualized in terms of approach and avoidance (Morgan et al., 2005). Nevertheless, the results differed from those observed in a sport study showing moderate relationships between these constructs (Boyce et al., 2009). From our point of view, the competitive environment in which athletes evolve may explain the better cohesion between coaches' and students' perceptions regarding the performance climate, because coaches are possibly more used to evaluating students' performance. In fact, it is plausible that most feedback from coaches is oriented toward the development of abilities to help athletes become the best or, at least, avoid being the worst (e.g., be selected on a basketball team starting five or avoid being on the bench). In the PE context, teachers and students experience or understand performance climates in a different way, even if performance climates and goals are separated into two dimensions (approach and avoidance). From this perspective, PE teachers should be aware of their pupils' perceptions, when they wish to implement performance-oriented teaching approaches. Therefore, it would be helpful for teachers to question students frequently on how they perceive the class climate. For example, teachers could ask their students (verbally or in writing), "In PE, do you feel it is the most important to be the best? To improve? To avoid being below average? What makes you feel this way?" That questioning could occur at the end or beginning of each semester or unit so that teachers are aware of students' needs. They could then adjust their messages according

to students' perceptions and plan for a more appropriately perceived learning environment.

An interesting part of this investigation was the consideration of the potential role of the teacher-induced climate on students' goal adoption mechanism. In this study, we categorized three teacher-induced motivational climates and verified if the predictive value of the student-perceived climate on students' goal adoption differed according to teaching practices. The results revealed that no matter what type of teacher-induced climate, the mastery climate–goals relationship was invariant across the groups. This positive relationship is congruent with what is usually reported in the literature (Barkoukis et al., 2010; Girard et al., 2015; Halvari et al., 2011; Wang et al., 2010). Moreover, such relationships support the hypothesis that suggests that a mastery climate is a key ingredient to its corresponding goals in PE. Nonetheless, it is noteworthy that scores for the mastery climate were high in each cluster, which may have affected the results. In a larger teacher sample, we might have been able to assess the robustness of this relationship with other clusters. The student-perceived performance-approach climate–goals relationship was also invariant, which is coherent with results from antecedent research considering three types of motivational climates (Erturan-İlker & Demirhan, 2012; Papaioannou et al., 2007). These results are encouraging regarding the benefits of *approach* goal adoption for students' engagement and motivation in PE (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012).

However, we observed some differences regarding relationships between the student-perceived performance (approach and avoidance) climate and students' adoption of performance goals (approach and avoidance). For example, in the mastery/performance-avoidance teacher-induced climate, we observed a nonsignificant contribution of the student-perceived performance-avoidance climate on students' adoption of performance-avoidance goals. That association was significant in the other two combinations of motivational climates, which is in line with past research (Erturan-İlker & Demirhan, 2012). It is interesting that when teachers report a mastery and a performance-avoidance climate, it is only when students perceive a performance-approach climate that they tend to adopt avoidance strategies. Moreover, a significant, positive relationship was

discerned between the student-perceived performance-avoidance climate and performance-approach goal adoption, indicating that even though teachers insist on the importance of avoiding situations where one could fail, it does not necessarily undermine the possibility that students address the task in a positive way and look for success. Nevertheless, that positive contribution was significantly lower in magnitude compared with the other combination of motivational climate.

In the mastery/performance-approach teacher-induced climate, the student-perceived performance-approach climate showed no association with students' adoption of performance-avoidance goals, suggesting that when students perceive that their teachers promote a performance-approach climate, it does not lead to the adoption of performance-avoidance goal adoption. In the other two combinations of teacher-induced climate (mastery/performance-avoidance climate and mastery climate), the small positive association that was present was in line with what was observed in a cohort of Greek adolescents (Papaioannou et al., 2007). Papaioannou, Marsh, and Theodorakis (2004) stated that a combination of both climates (mastery and performance) could be beneficial for students' motivation in PE: "A good teacher can effectively combine a task-involving[3] climate with some aspects of an ego-involving[4] climate such that the effects of the ego-involving climate are positive" (p. 114). Our results reinforce this idea: It seems that the combination of *approach* climates (mastery and performance-approach) could lead students not to pursue avoidance goals when they perceive a performance-approach climate. For PE teachers, this means that using "friendly-rivalry" with self-reference evaluation criteria (Horn & Butt, 2014) or using competition in which personal progression is the focus of the task could be considered promising pedagogical approaches.

Nevertheless, mixed results regarding performance-approach and -avoidance climate–goals relationships might also indicate that performance climate measures could overlap. The low internal consistency of performance-avoidance scales adds to that possibility. It might suggest a lack of understanding from participants regarding the difference between the approach and avoidance constructs. The assessment of the performance-avoidance climate among students

[3] *Task-involving* climate is another designation for *mastery* climate.
[4] *Ego-involving* climate is another designation for *performance* climate.

and teachers represents a research challenge for the future. Another hypothesis might be that other variables interact or mediate these relationships, which could explain goal adoption in PE. For example, it is plausible that perceived competence could act as mediator in the climate–goals relationship (Elliot, 1999), but we did not consider this concept in this study.

Taken together, the results imply that, most of the time, students' perceptions are crucial for predicting their goal adoption in PE. Nevertheless, other factors may affect teachers' and students' perceptions of the motivational climate. For students, past PE and sport experiences and other aspects related to PE achievement (e.g., fitness, motor abilities, attitudes, and beliefs toward PE) might explain how students from the same class perceive the climate differently. As for teachers, their perceptions may also be affected by other variables such as their past sport experiences, their personal beliefs about class management, learning and performance, and their students' ability levels. Therefore, even though PE teachers are responsible for multiple groups of students, they need to consider all individuals with their particularities. Of course, it is not realistic for teachers to adapt their teaching to each of their 30-plus students per class, and it might be discouraging to them. In line with other researchers' recommendations (Ames, 1992; Boyce et al., 2009; Morgan et al., 2005), it is crucial that teachers consider students' perceptions throughout the school year. Moreover, teachers would benefit from training sessions on the dimensions of motivational climate and how to promote a positive motivational climate. From this perspective, they could have a better portrait of their students' motivational orientations and knowingly choose the climate they want to implement for them.

Limitations and Conclusion

Despite its contribution in the PE domain, this study has limitations. First, data collection was based on one wave of assessment. Causality cannot be inferred in this regard. Longitudinal studies could help to better document the evolution of student-perceived and teacher-induced motivational climates. Second, self-reported measures for the teacher-induced motivational climate may not be exact representations of what occurs in classes. In this regard, future research should focus on a more detailed teacher-induced climate assessment. Although beyond the scope of this article, observational

measures and interviews with teachers might clarify these relationships. Smith, Quested, Appleton, and Duda have recommended (2016) such an approach that could serve as a framework for further studies. Third, this study was conducted in the province of Quebec. In this context, PE is mandatory at the high school level. Such context may affect students' perceptions and their teachers' pedagogical approaches. From this perspective, generalization of the results to other populations is limited. Comparative studies between different populations could verify if the climate–goals relationship varies across multiple subgroups.

In summary, this study enhances understanding of the factors underlying achievement goal adoption in high school PE. Being aware that they might induce a different motivational climate, depending on the students they are addressing—and acknowledging that each student might perceive the climate in his or her own way—could help teachers adjust their practices to foster goals that are beneficial for students' motivation and engagement.

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