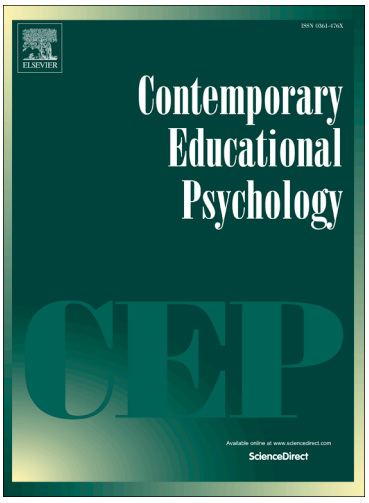

Peer and Teacher Influences on the Motivational Climate in Physical Education: A Longitudinal Perspective on Achievement Goal Adoption

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Peer and Teacher Influences on the Motivational Climate in Physical Education: A Longitudinal Perspective on Achievement Goal Adoption

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Abstract

This study examined the temporal patterns and concurrent effects of teachers and peers on the motivational climate to student's achievement goal adoption in the physical education (PE) classroom. On three occasions, over the course of one school year, 655 students in Years 7, 8, and 9 of a secondary school completed measures of approach-avoidance goal adoption, perceptions of the teacher-created motivational climate and perceptions of the peer-created motivational climate in PE. Measures were taken towards the end of each school term. Perceptions of a teacher mastery climate were found to decrease over the course of the school year, while perceptions of a peer performance climate increased. Multilevel analyses considered the intraindividual, interindividual and interclass levels and revealed that perceptions of both the teacher and peer climate influenced student achievement goal adoption over the course of the school year. The findings indicate that future research would benefit from incorporating peer as well as teacher influences on the motivational climate in order to understand the dynamics of student motivation in the PE classroom.

Keywords: motivational climate, peers, teachers, achievement goal theory, physical education

Peer and Teacher Influences on the Motivational Climate in Physical Education:

A Longitudinal Perspective on Achievement Goal Adoption

1. Introduction

Creating learning environments that optimise student motivation and maximise learning and achievement is of great importance to physical educators as the benefits reach far beyond the physical education (PE) classroom. Considerable empirical support shows that positive experiences of school PE influence young people's attitudes, motivation, intentions and participation in physical activity outside of school (e.g., Barkoukis, Hagger, Lambropoulos, & Torbatzoudis, 2010; Cox, Smith, & Williams, 2008; Hagger, Chatzisarantis, Biddle & Culverhouse, 2003; Standage, Gillison, Ntoumanis, & Treasure, 2012), while fit and active children consistently outperform less active and unfit children academically (Centers for Disease Control and Prevention, 2010; National Association for Sport and Physical Education, 2016). In light of this, the continued global concern over young people's health (World Health Organisation, 2016), and that PE is the one physical context that can access all young people, understanding the influences on the optimal PE environment has never been more important.

Over the last 30 years, one of the most popular motivational perspectives that has examined the effect of the learning environment, or 'motivational climate', on students' motivation, learning and achievement is the Achievement Goal Approach (Ames, 1984; Dweck, 1986, 1990; Elliot, 1997, 1999; Nicholls, 1984, 1989). According to this approach, students' are motivated by the pursuit of feeling competent, and the salient cues and structure of the environment (motivational climate) can influence whether a student is striving to develop their competence, demonstrate their competence, or avoid incompetence (Dweck, 1986; Elliot, 1999, 2005; Nicholls, 1989). A recent systematic review on the motivational climate in sport and physical activity contexts, including PE, identified that the majority of

research using this approach has focused on the coach or teacher as the main socializing agent (Harwood, Keegan, Smith & Raine, 2015). However, these settings involve considerable interaction between peers, with young people working together to learn, develop and practice skills, and play sports, particularly in PE classes. The current study sought to explore the influence of peers and teachers on the motivational climate of PE lessons and the quality of students' motivation.

1.1 The Classroom Environment and Student Motivation

The physical education classroom shares many similarities with the classrooms of other subject areas whereby teaching activities make students' competence and incompetence is salient. Students may be required to answer questions in front of their classmates, give presentations on a topic area, or contribute to class and small group discussions. These activities are also present in a PE classroom with the addition of students being able to observe each other performing skills and giving demonstrations, and participating in competitive situations. This public nature of competence means that the striving for competence or striving to avoid incompetence is therefore prominent in all classroom settings. The cognitive or physical competence of students is unambiguous, on public display, and is easily and regularly evaluated by the self and others against a standard of excellence.

Accordingly, in line with the Achievement Goal Approach, students can adopt one of four achievement goals (Elliot & McGregor, 2001): Mastery-approach (MAp) goals which reflect a striving for personal improvement and mastery of tasks, for example trying to improve one's serve in badminton; Performance-approach (PAp) goals which reflect a striving for doing better than others, for example trying to score more goals than others in your class; Mastery-avoidance (MAv) goals which reflect a striving for avoiding self-referential or task-referential incompetence, for example trying to avoid completing a dribbling task in football worse than you did last time; and performance-avoidance (PAv)

goals which reflect a striving to avoid being worse than others, for example trying to avoid finishing last in an athletics race. Across both the educational and sport literatures the beneficial effects of adopting a MAp goal as opposed to the other types of goals on young people's cognitions, affect and behaviour is well documented (Grant & Dweck, 2003; Hulleman, Schrager, Bodmann & Harckiewicz, 2010; Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012).

The motivational climate of the lesson is one factor that has a significant influence on students' personal goal adoption. If the salient cues and structure of the environment emphasizes competition and being better than others, then a performance climate is apparent, whereas emphasising task mastery, effort, and self-improvement leads to a mastery climate. During adolescence, peers play an increasingly important role in young people's lives. They can provide information about what is valued and important in relation to particular tasks and activities and can therefore affect the criteria an individual uses to define and judge their own competence and success, i.e., their achievement goal (Pintrich, Conley & Kempler, 2003). Consequently, given the interactions between peers during lessons, peers have a key role in shaping the social context or motivational climate of a lesson by providing cues and messages about what is valued in terms of competence and success.

1.2 Peer Influences on Motivation in the Classroom

Peers are important social agents in classroom settings, having an influence on student's learning, motivation, school adjustment, and achievement (Altermatt & Pomerantz, 2003; Kindermann, 2007; Wentzel, Baker & Russell, 2009). Research has identified that interactions between peers allows them to establish their own culture, as well as providing emotional support, help in solving problems, personal validity, companionship and entertainment, and helping identity development (Wentzel, 1999, 2005). Additionally, high perceptions of feelings of support, encouragement and care, as well as positive peer

relationships, strong peer networks, positive peer role models and interactions, and low levels of peer pressure have been found to have positive effects on a range of achievement-related behaviours (Patrick, Ryan & Kaplan, 2007; Patrick, Kaplan & Ryan, 2011; Ryan & Patrick, 2001; Wentzel, 2005).

Longitudinal evidence also supports the importance of peers in influencing young people's motivational outcomes (e.g., Makara & Madjar, 2015; Ryan & Shim, 2012; Shin & Ryan, 2014). The dynamics of friendship selection and influence over a school year effected students' achievement goal adoption, with similarities between students in terms of their academic goals being associated with students identifying each other as friends within their classrooms (Shin & Ryan, 2014). Moreover, teacher classroom goal structures and perceptions of the peer climate (i.e., the extent to which young people perceived themselves to have positive peer interactions and support) have both been found to have positive effects on students' social goal adoption (Makara & Madjar, 2015). Although, the effects were stronger for teacher classroom goal structures than for perceptions of the peer climate. Since peers are also an important source of competence information for young people in achievement settings (Altermatt & Pomerantz, 2003; Horn, 2004), it is important to examine the motivational climate from the perspective of the influence of peers on the environmental cues they provide about competence and success and its effect on student motivation in the classroom.

1.3 Motivational Climate Research in Physical Education

Research on the motivational climate in PE and Sport has been buoyant for several decades with a number of reviews attempting to synthesise the literature (see Braithwaite, Spray & Warburton, 2011; Harwood et al., 2015; Harwood, Spray & Keegan, 2008; Ntoumanis & Biddle, 1999). Collectively, these have revealed consistent evidence for the association of a mastery climate with adaptive motivational outcomes and a performance

climate with maladaptive motivational outcomes across a range of physical settings. The most recent review by Harwood and colleagues (2015) identified 104 studies in total, of which 34 examined the motivational climate in the PE context, with all but one of these focusing on the teacher as the main social agent. Moreover, only eight of the 104 studies explored approach-avoidance achievement goals in relation to the motivational climate, but of these studies five were in the PE context. Across the eight studies that included approach-avoidance goals, Harwood and colleagues (2015) concluded that for perceptions of a mastery climate there was a moderate positive association with MAp goals and a small positive correlation with both MAv and PAp goals. Perceptions of a performance climate had a moderate positive association with both PAp and PAv goals and a small positive association with MAv goals.

Across the five studies in PE all focused solely on the teacher in relation to the climate and effects on students' approach-avoidance goal adoption (Cury, Da Fonseca, Rufo & Sarrazin, 2002; Gao, Lochbaum & Padlog, 2011; Halvari, Skejesol, & Bagoien, 2011; Ommundsen, 2006; Wang, Lim, Aplin, Chia, McNeill, et al., 2008). There was consistent support for the association of perceptions of a mastery climate with MAp goal adoption and a performance climate with PAp and PAv goal adoption. However, while Cury and colleagues found a negative association between perceptions of a performance climate and the adoption of MAp goals, Ommundsen found a positive relationship. He also found a positive relationship between perceptions of a mastery climate and PAp goals.

In a prospective study over one school year, Halvari and colleagues (2011) found support for changes in perceptions of the motivational climate being associated with changes in goal adoption, which in turn influenced students' outcomes. This is particularly important given the links between motivation in PE and students' wider health and educational outcomes documented earlier. Specifically, changes in perceptions of the mastery climate

positively predicted changes in mastery goals, which in turn positively predicted intrinsic motivation towards PE, positive attitude towards daily physical activity, and exertion in PE class one year later. Interestingly, specific elements of the performance climate (i.e., normative praise and negative emotional tune), positively predicted changes in PAp and PAv goals respectively. These goals then had differential effects on outcomes with changes in PAp goals positively predicting intrinsic motivation towards PE, positive attitude towards daily physical activity, and exertion in PE class one year later, while changes in PAv goals negatively predicted intrinsic motivation towards PE one year later. Despite these encouraging findings, the overall evidence for the influence of the motivational climate on the quality of students' approach-avoidance motivation in PE is limited to the effects of the teacher and is somewhat inconsistent.

1.4 Peer Influences on the Motivational Climate in Physical Education and Sport

Research has shown that students with strong relationships with both teachers and peers have the most positive physical education experiences (Cox & Ulrich-French, 2011), and that the quality of students' motivation is associated with perceptions of the motivational climate created by a range of significant others (Carr & Weigand, 2001; Escarti, Roberts, Cervello & Guzman, 1999). When the emphasis of parents, teachers, peers, or sporting heroes led to perceptions of a mastery climate students in PE reported being more likely to adopt mastery goals. Whereas parental, peer, teacher, or sporting hero emphasis that led to perceptions of a performance climate were associated with the adoption of performance goals. However, despite this evidence only five of the studies in the systematic review of Harwood and colleagues (2015) included social agents other than adults or considered concurrent influences of a range of social agents.

Research on the peer-created motivational climate in the sport literature has largely emanated from the work of Vazou and colleagues (Ntoumanis & Vazou, 2005; Vazou,

Ntoumanis & Duda, 2005, 2006). Two dimensions of a peer climate in youth sport, drawing on both achievement goal theory (Ames, 1992, Nicholls, 1989) and self-determination theory (Deci & Ryan, 2000), were identified (Ntoumanis & Vazou, 2005). Task-involving climates emphasise autonomy, cooperative group learning, and personal improvement and effort. In this type of climate peers offer help and encouragement to improve, value and accept one another, and encourage and emphasize effortful involvement and persistence. Whereas ego-involving climates emphasise the demonstration of normative ability and competition among teammates. In this climate peers engage in negative behaviour such as criticising others and being unsupportive, focus on within-team competition, and value high ability (Ntoumanis & Vazou, 2005).

Across several studies, task-involving perceptions of the peer climate have been associated with higher levels of physical self-worth, enjoyment, a task orientation, psychological need satisfaction, and lower levels of an ego orientation and athlete burnout. On the other hand, ego-involving perceptions of the peer climate have been associated with higher levels of an ego orientation and athlete burnout and lower levels of relatedness need satisfaction (Jõesaar, Hein & Hagger, 2011, 2012; Smith, Gustafsson & Hassmén, 2010; Vazou, 2010; Vazou et al., 2006). In addition to this, the importance of examining the concurrent effects of social agents was shown by the relative influence of coach and peer climates on athlete outcomes differing (Vazou et al., 2006).

Longitudinal evidence also supports the importance of peers in youth sport settings, as perceptions of task-involving peer and coach climates were associated with more adaptive outcomes than perceptions of ego-involving peer and coach climates over the course of a year (Ntoumanis, Taylor & Thøgersen-Ntoumani, 2012). Moreover, the negative effects of a peer ego-involving climate on athletes' outcomes was stronger than for the coach ego-involving climate. Since motivational climate is a variable that exists at multiple levels of influence,

differences in athlete outcomes were sometimes more influenced by changes in an individual's perception (intraindividual), or by differences between individuals in their perceptions (interindividual), or by differences between teams' perceptions (interteam) of the climate, depending on the outcome studied. Examining both social agents concurrently and at different levels of influence revealed a more nuanced understanding of the effects of the motivational climate in sports settings.

In PE, research on the peer-created climate has been limited with one study incorporating perceptions of the peer climate in relation to students' physical self-concept and physical activity over the transition to secondary school. However, no significant associations were found, possibly because this transition occurs just before adolescence and the point at which peers become increasingly salient (Taylor, Spray & Pearson, 2014). In light of the importance of PE to students' wider health and educational outcomes, the well-established beneficial effects of mastery motivational climates, and the encouraging findings between peer climate and athlete outcomes in youth sport, exploring the effect of peers on the motivational climate of PE lessons is essential. A more comprehensive understanding of the factors that influence optimal learning environments in PE will help schools create environments that foster adaptive motivational processes in young people. These environments will influence outcomes that sustain and promote participation in physical activity within and beyond the school curriculum.

1.4 The Present Study

The present study sought to examine the influence of teacher and peer motivational climates on student's achievement goal adoption over the course of a school year in PE. Two main research questions formed the basis of the study. 1) What are the temporal patterns of teacher and peer motivational climates in PE over the course of a school year? 2) How do perceptions of the teacher and peer motivational climates effect students achievement goal

adoption at the intraindividual level, interindividual level and the interclass level over the course of a school year? For the second question, the following areas are of interest, a) do the relationships between climate and goals at the start of the year persist or change over the course of a school year? b) Are perceptions of the teacher motivational climate a stronger predictor of students' achievement goal adoption than perceptions of the peer motivational climate or vice versa? c) At which level are perceptions of the teacher and peer motivational climate most influential? Is it students' personal perceptions of the PE motivational climate (intraindividual)? Or perceiving the PE motivational climate created by your teacher or peers to be more mastery or performance focused than others in your class (interindividual), or perceiving the motivational climate created by your teacher or peers to be more mastery or performance focused than students in other classes perceived the climate created by their teacher or peers to be (interclass)? Finally, the study will explore whether the relationships at each level of analysis between perceptions of the teacher and peer PE motivational climates vary over the course of a school year.

The following hypotheses were based on previous research in PE and theoretical propositions of the links between climate perceptions and achievement goals. At the intraindividual level, it was hypothesised that changes in students' perceptions of teacher and peer mastery motivational climates would be associated with the adoption of MAp and MAv goals. Whereas changes in students' perceptions of teacher and peer performance motivational climates would be associated with the adoption of PAp and PAv goals.

At the interindividual level, it was hypothesised that students who reported higher average perceptions than other students in their class of the teacher and peer mastery climates would be more likely to adopt MAp and MAv goals. Whereas students who reported higher average perceptions than other students in their class of teacher and peer performance climates would be more likely to adopt PAp and PAv goals.

At the interclass level, it was hypothesised that students in classes with higher average perceptions of the teacher and peer mastery climates would be more likely to adopt MAp and MAv goals. Students in classes with higher average perceptions of teacher and peer performance climates would be more likely to adopt PAp and PAv goals. In line with the findings of Ntoumanis and colleagues (2015), these relationships were not expected to vary over time at any level. Given that Harwood and colleagues (2015) concluded that across the sport literature there was a small positive correlation between perceptions of a mastery climate and PAp goals and between perceptions of a performance climate and MAv goals, it was anticipated that these findings could emerge at all levels of analysis. Due to the limited research comparing teacher and peer influences on PE motivational climates there was no specification of whether teacher or peers would be most influential on students personal goal striving.

2. Method

2.1 Participants and Procedures

Male (n=359) and female (n=296) participants from physical education classes in Years 7, 8 and 9 at a state comprehensive high school in East England, United Kingdom participated in the research. Participants were aged between 11 and 14.58 years ($\underline{M}$ = 12.74, $\underline{SD}$ = 0.91 years) at the start of the research. The majority of participants were White British (95.4%) with a small proportion of other ethnic groups being represented (Black/Black British 0.3%; Mixed Parentage 2.3%; Asian/Asian British 1.1%; Other 0.9%) Students were taught in single sex PE ability streamed classes based on teacher assessment at the start of the school year (N = 35) for the activities with a permanent teacher (Male = 5; Female = 5) who taught the students a variety of activities, e.g., games activities, dance, gymnastics, athletics, rounders, cricket, tennis, from the PE curriculum for the whole school year. It was important for the research that the students and teachers remained with each other for the duration of the

school year. Students were taught two lessons per week by their teacher. Data was collected on three occasions throughout the school year, towards the end of the Autumn, Spring and Summer terms. These timings were chosen so that the climate of the class could be established prior to the data collection in each term. Of the 655 students from wave 1, 429 students completed questionnaires at all waves of measurement, 536 students completed questionnaires at waves 1 and 2 only, and 490 students completed questionnaires at waves 1 and 3 only.

Procedures followed the ethical guidelines of the British Psychological Society and were approved by the ethical advisory committee at the authors' institution. Consent was sought from the head teacher for the school to participate in the research project. Following which parental consent was sought by asking parents if they wished to exclude their child from the study (less than 1% of parents chose this option). In addition, at each wave of measurement all participants were asked to provide their informed assent for participation following a written and verbal explanation of the study. A trained research assistant administered the questionnaires prior to a normal curriculum PE lesson. Participants were given an explanation of how to complete each section of the questionnaire and were provided with the opportunity to ask questions. All participants were assured that the information collected would be anonymous, remain confidential and that they could withdraw at any time. The questionnaire took approximately 15-20 minutes to complete. The research assistant answered participant questions on specific items and supported those with lower reading ability. These procedures were repeated at each measurement occasion.

2.2 Measures

***2.2.1 Demographic Information*.** Participants provided data relating to their PE class, gender, PE teacher, ethnicity and date-of-birth on each measurement occasion. This information allowed the data from participants to be matched on subsequent measurement occasions.

2.2.2 Perceptions of the Teacher Motivational Climate. Students' perceptions of the motivational climate created by the teacher in their PE class was assessed using twelve items from the Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ; Papaioannou, 1994, 1998). Items were answered on a 5-point Likert scale that ranged from *strongly disagree* (1) to *strongly agree* (5). Six items assessed each type of climate and students' responded to the stem '*In this PE class the teacher…*' Example items included 'Is pleased when students learn something new' (mastery climate) and 'focuses on those students who perform to a high level in the class' (performance climate).

2.2.3 Perceptions of the Peer Motivational Climate. Students' perceptions of the motivational climate created by their peers in their PE class were assessed using twenty items adapted from the Peer Motivational Climate in Youth Sport Questionnaire (PeerMCYSQ; Ntoumanis, & Vazou, 2005). The items were arranged into five subscales which reflected different aspects of the peer motivational climate, improvement (four items), relatedness support (three items), effort (five items), intra-class competition/ability (five items) and intra-class conflict (three items). All items were answered on a 7-point Likert scale that ranged from *strongly disagree* (1) to *strongly agree* (7) and students responded to the stem '*In this PE class, most students…'* Example items included 'offer to help their classmates develop new skills' (improvement), 'make their classmates feel valued' (relatedness support), 'encourage their classmates to try their hardest' (effort), 'try to do better than their classmates' (intra-class competition/ability) and 'criticise their classmates when they make mistakes' (intra-class conflict). The PeerMCYSQ posits a hierarchical factor structure with improvement, relatedness support and effort underpinning a higher order task-involving/mastery climate and intra-class competition/ability and intra-class conflict underpinning a higher order ego-involving/performance climate. The current study focused on only the two higher order climate perceptions.

In order to adjust the PeerMCYSQ to the physical education context the questionnaire items were adapted by the author and sent to a panel of six sport psychology experts for assessment. These experts examined the focus of the item in relation to the motivational climate, how well the item captured the targeted structure, the clarity of wording, suitability for children aged 11-14 and any suggestions for further improvements. Following this feedback the items were adapted and pilot tested with a sample of 160 students (Male = 78; Female = 82) from the same school but who were not to be included in the main study. The pilot study sought the views of the students about any problematic items and allowed for a test of the factorial validity of the scale in the PE context prior to the main study to determine how well the items had adapted to the PE context (Hierarchical structure, CFI = .915, NNFI = .925, SRMR = .095). The procedures of the pilot study followed those of the main study outlined above.

2.2.4 Achievement Goals. Goal adoption was assessed using twelve items adapted from the Achievement Goal Questionnaire-Revised (AGQ-R; Elliot & Murayama, 2008). It was decided to adapt items from this questionnaire rather than using a sport specific measure of achievement goals as the mastery-avoidance items had been reworded to remove the issues with the inclusion of affective components in these items. All items were answered on a 7-point Likert scale that ranged from *strongly disagree* (1) to *strongly agree* (7) and were preceded by the stem '*In this PE class…'* Three items assessed each type of goal. Example items included, 'My aim is to completely master the tasks and skills in this class' (MAp goal), 'My aim is to avoid learning less than I possibly could' (MAv goal), 'My aim is to do well relative to other students' (PAp goal), and ' My aim is to avoid doing worse than other students' (PAv goal).

2.3 Data Analysis

2.3.1 Preliminary Analyses and Descriptives. Descriptive statistics and internal reliability coefficients were calculated for all study variables across all measurement occasions. The extent and pattern of missing data across the three measurement occasions was assessed. Independent sample t-tests were used to determine whether there were any differences in the initial perceptions of the substantive variables under investigation between those students who completed all three waves of measurement and those who missed any of the other waves of measurement.

The factorial validity of the measures was tested at all measurement occasions using EQS 6.1 software (Bentler & Wu, 2002). A series of nested models testing plausible alternative factor structures was analysed at each time point for the AGQ-R, LAPOPECQ and adapted PeerMCYSQ questionnaires. These analyses assessed whether the a priori factor structure was evident at each time point. For the AGQ-R, these models tested plausible alternatives to the specified 2 x 2 factor structure and were consistent with the models examined in research using other achievement goal measures e.g., the Achievement Goals Questionnaire for Sport (Conroy, Elliot & Hofer, 2003). For the LAPOPECQ, these models tested plausible alternatives to the specified two factor structure. For the adapted PeerMCYSQ these models tested plausible alternatives to the hierarchical factor structure of improvement, relatedness support and effort subscales underpinning a higher order mastery climate and intra-class competition/ability and intra-class conflict subscales underpinning a higher-order performance climate.

The structural stability and invariance over time of the approach-avoidance goals and teacher and peer mastery climates was assessed using a series of nested models with progressively more constrained parameters. The procedure followed previous research (Conroy, Elliot et al., 2003; Conroy, Kaye, & Coatsworth, 2006; Conroy, Metzler, & Hofer, 2003), and examined eight separate models, one for each achievement goal and one for each

climate. Model fit was assessed using the thresholds for both absolute and relative fit indices that are recommended within the literature (Hu & Bentler, 1999). For relative fit indices (CFI and NNFI), values of .90 and .95 were taken as representing an acceptable and good fit to the data respectively. For absolute fit indices (RMSEA and SRMR), values of .06 and .08 or lower were taken as indicating good model fit. Changes in model fit were assessed using both the chi-square difference test and also changes in the relative and absolute fit indices, which again were compared with accepted values within the literature (CFI and NNFI = .01, RMSEA = .02, SRMR = .03). These multiple indices of changes in model fit were used because the chi-square statistic can be affected by large sample sizes (Marsh, Balla, & McDonald, 1988). In such samples, increasing the constraints on the model may lead to a statistically significant worsening of fit with no change in other fit indices, meaning it is possible to accept the more restricted model in large samples (Widaman, Ferrer & Conger, 2010).

2.3.2 Main Analyses. The study hypotheses were explored using multilevel modelling through testing a series of models using MLwiN 2.23 (Rasbash, Browne, Healey, Cameron, & Charlton, 2011). The multilevel structure of the data in the present investigation was represented through repeated measurement occasions being nested in individuals who were nested in classes, thus giving a three level structure to the data. The data analytic strategy followed that outlined in Ntoumanis et al. (2012) to explore intraindividual, interindividual and interclass effects on students' achievement goal adoption over the course of one school year (see Ntoumanis et al., 2012 for specific details). Separate models were assessed for each dependent variable (Hox, 2010) and standardised scores of teacher and peer mastery and performance climates were used to aid interpretation of predictors measured on different Likert scales.

First, the temporal patterns of the study variables were assessed using an unconditional growth model. This examined the initial status of each study variable and whether there was any systematic change over time in the sample. This model included time centred at the first measurement occasion as the only predictor. The population covariance of the level 2 residuals was analysed to determine the relationship between participants' true initial status and true rate of change on each variable.

Next, a series of conditional models were examined to assess the predictive utility of teacher and peer mastery and performance climates to students' achievement goal adoption. Initially, gender and age were included in each model but due to non-significant effects and in the interest of parsimony they were removed from the final models reported in the analysis section. At the intraindividual level the four climate variables, centred on each student's unique mean over time, and their associated interaction with time were entered as predictors of each achievement goal. This revealed the predictive effects of perceptions of the climate on each achievement goal at the start of the study and whether this relationship varied at the subsequent measurement occasions.

At the interindividual level the four climate variables, centred on each class's unique mean, and their associated interaction with time were entered as predictors of each achievement goal. This indicated whether students' average perception of the motivational climate relative to their classmates' perceptions predicted each achievement goal at the start of the study and whether this relationship varied at the subsequent measurement occasions.

At the interclass level the four climate variables, centred on the overall mean across classes, and their associated interaction with time were entered as predictors of each achievement goal. This revealed whether class average perceptions of the motivational climate relative to the grand class mean predicted each achievement goal at the start of the study and whether this relationship varied at the subsequent measurement occasions

(Ntoumanis et al., 2012). Finally, an estimate of effect size (R^2) at each level was calculated by comparing the final model with the unconditional growth model (Singer & Willett, 2003).

3. Results

3.1 Preliminary Analyses and Descriptive Statistics

3.1.1 Missing Data. Missing data across waves of measurement was a consequence of normal absences on the days of questionnaire administration. If participants completed a questionnaire at any measurement occasion there was little missing data (<1%), consequently with the use of MLwiN for the main analyses it was decided not to replace missing data. There were no differences in initial perceptions of the teacher mastery ($t(653, 439) = .55$, $p > .05$); peer mastery ($t(653, 430) = -.15$, $p > .01$); and peer performance climates ($t(653, 444) = .24$, $p > .01$) or the PAv goal adoption ($t(653, 428) = 1.72$, $p > .01$) of those students who completed all three waves of measurement and those who missed any other measurement occasion. However, students who completed all three waves of measurement reported lower initial perceptions of the teacher performance climate ($t(653, 429) = -1.96$, $p \leq .05$) and higher initial perceptions of their MAp ($t(653, 408) = 2.94$, $p < .01$), MAv ($t(653, 455) = 2.74$, $p < .01$) and PAp goal adoption ($t(653, 433) = 2.45$, $p < .05$).

3.1.2 Factorial validity and longitudinal factorial invariance. The three questionnaires demonstrated a good fit to the data at each wave of measurement (e.g., Ranges across waves: AGQ-R, 4-factor model, CFI = .936-.958, NNFI = .912-.943, SRMR = .051-.062; PeerMCYSQ, hierarchical model, CFI = .925-.934, NNFI = .914-.925, SRMR = .078-.083; LAPOPECQ, 2-factor model, CFI = .910-.938, NNFI = .888-.922, SRMR =.054-.060).

The longitudinal factorial invariance analyses revealed that all achievement goals achieved at least strong factorial invariance through comparisons of the absolute and relative fit indices, meaning that they had invariant factor loadings and intercepts across time. Teacher and peer performance climates and teacher mastery climate achieved strict factorial

invariance; they had invariant factor loadings, intercepts, and unique factor variances across time. Peer mastery climate achieved weak factorial invariance (i.e., invariant factor loadings across time). Overall, these results suggest that the measures of achievement goals and climate exhibited acceptable structural stability over time (see online supplemental appendix for tables and detailed analysis).

3.1.3 Descriptive statistics. Table 1 presents the mean scores, standard deviations, and internal consistency estimates for each variable at each measurement occasion. Cronbach alpha values met or exceeded .70 for all variables at each occasion. At each wave of measurement students reported moderately high perceptions of a teacher mastery climate, and both types of peer climates. Perceptions of the teacher performance climate were moderate with values close to the scale midpoint. Students reported high scores for the adoption of MAp goals and moderately high scores for MAv, PAp and PAv goals at each measurement occasion.

Bivariate correlations between the motivational climate variables and the achievement goals are presented in Table 2. The teacher mastery climate, teacher performance climate and peer performance climate demonstrated consistent and expected relationships with each of the four goals across each wave of measurement. The peer mastery climate exhibited a moderate positive relationship with MAp goals across each wave of measurement, weak positive relationships with MAv and PAp goals at waves 1 and 3 and a weak positive relationship with PAv goals at wave 3. Moderate positive relationships between MAp, MAv and PAp goals and a strong positive relationship between PAp and PAv goals were observed at each wave of measurement. For the perceptions of the motivational climate, weak to moderate negative relationships were observed between teacher mastery and both teacher and peer performance climates, while moderate to strong relationships were observed with the peer mastery climate. The teacher performance climate had a weak negative relationship with

the peer mastery climate and a moderate to strong relationship with peer performance climate at each wave of measurement. Finally, the peer mastery climate had a moderate negative relationship with the peer performance climate at each wave of measurement.

3.2 Main Analyses: Temporal Patterns

3.2.1 Achievement Goal Adoption. Results of the unconditional growth models revealed that the average true change trajectory for each achievement goal had a non-zero intercept at the first measurement occasion (MAp $\beta = 5.90$; MAv $\beta = 5.10$; PAp $\beta = 5.10$; PAv $\beta = 5.25$, *ps*<0.001) and a non-zero slope (MAp $\beta = -0.12$; MAv $\beta = -0.21$; PAp $\beta = -0.14$; PAv $\beta = -0.17$, *ps*<0.001). The average student therefore had moderately high to high adoption of each achievement goal at the first measurement occasion but this declined over the course of the school year.

3.2.2 Perceptions of the Motivational Climate. The unconditional growth models revealed that the average true change trajectory for each perception had a non-zero intercept at the first measurement occasion (Teacher Mastery $\beta = 4.12$; Teacher Performance $\beta = 2.61$; Peer Mastery $\beta = 4.90$; Peer Performance $\beta = 4.00$, *ps*<0.001) and a non-zero slope for perceptions of the teacher mastery climate ($\beta = -0.05$, $p<0.01$) and perceptions of the peer performance climate ($\beta = 0.05$, *p*<0.5). The average student, therefore had moderately high perceptions of the teacher mastery climate, and both peer climates, and moderate perceptions of the teacher performance climate at the start of the study. These perceptions declined over the course of the school year for perceptions of the teacher mastery climate, but increased for perceptions of the peer performance climate. There were no significant changes in perceptions of the teacher performance and peer mastery climates (*p*>0.05). For perceptions of the peer performance climate, those who had higher levels at the start of the study increased their perceptions less rapidly over the course of the school year than those with lower perceptions ($r = -0.35$, $p<.01$). No other significant covariance estimates were found.

3.3 Predicting Achievement Goal Adoption over a School Year

The final models for each achievement goal from the multilevel analyses are presented in Table 3. It shows both the fixed effects of perceptions of the teacher and peer mastery and performance motivational climates and their effects over time at the intraindividual, interindividual and interclass levels.

3.3.1 Mastery-approach goals. At the intraindividual level, within-student changes in their perceptions of the teacher mastery climate ($\beta = .17$, $p<.001$), peer mastery climate ($\beta = .14$, $p<.001$) and peer performance climate ($\beta = .09$, $p<.05$) positively predicted the adoption of MAp goals at the end of the Autumn term. Students who reported positive changes in these climate perceptions reported being more likely to adopt goals that focused on learning, self-improvement and task mastery at the start of the study.

At the interindividual level differences in students' average perceptions of the teacher mastery climate ($\beta = .15$, $p<.01$) and peer mastery climate ($\beta = .17$, $p<.001$) positively predicted MAp goal adoption at the start of the study. Students who perceived their teacher and peers to value task mastery, effort and self-improvement more than other students in their class were more likely to adopt goals that focus on learning, self-improvement and task mastery at the start of the study.

Finally, at the interclass level, differences in class average perceptions of the teacher mastery climate ($\beta = .18$, $p<.05$) positively predicted MAp goal adoption. Students in classes that perceived their teacher to value learning, effort and self-improvement more than students in other classes perceived of their teacher to do so reported being more likely to adopt goals that focused on learning, self-improvement and task mastery at the start of the study. There were no significant interaction effects with time at any level of analysis, suggesting that the relationships between climate and goals observed in the first term persisted across the school year.

3.3.2 Mastery-avoidance goals. At the intraindividual level, within-student changes in their perceptions of the peer performance climate ($\beta = .13$, $p<.05$) positively predicted the adoption of MAv goals at the end of the Autumn term. Students who reported positive changes in their perceptions of the value and emphasis that peers placed on outperforming others, social comparison and normative success reported being more likely to adopt goals focusing on a concern with not doing as well as they previously have at the activity.

At the interindividual level differences in students' average perceptions of the teacher mastery climate ($\beta = .25$, $p<.01$) positively predicted MAv goal adoption at the start of the study. Students who perceived their teacher to value task mastery and self-improvement more than other students in their class were more likely to adopt goals that focused on a concern with not doing as well as they previously have at the activity.

Finally, at the interclass level, differences in class average perceptions of the teacher mastery climate ($\beta = .30$, $p<.05$) positively predicted MAv goal adoption. Students in classes who perceived their teacher to value learning and improvement more than students in other classes perceived of their teacher reported being more likely to adopt goals focusing on a concern with not doing as well as they previously have at the activity. There were no significant interaction effects with time at any level, suggesting that the relationships between climate and goals observed in the first term persisted across the school year.

3.3.3 Performance-approach goals. At the intraindividual level within-student changes in their perceptions of the teacher performance ($\beta = .10$, $p<.05$), peer mastery ($\beta = .20$, $p<.001$) and peer performance ($\beta = .18$, $p<.001$) climates positively predicted the adoption of PAp goals at the end of the Autumn term. Students who reported positive changes in their perceptions of these climates reported being more likely to adopt goals that focused on doing better than other students at the start of the study.

At the interindividual level, differences in students' average perceptions of the teacher performance ($\beta = .22$, $p<.001$), peer mastery ($\beta = .18$, $p<.01$) and peer performance ($\beta = .32$, $p<.001$) climates positively predicted PAp goal adoption at the start of the study. Students who perceived their teacher and peers to value these aspects more than did other students in their class were more likely to adopt goals that focused on doing better than other students. The negative relationship between perceptions of the teacher mastery climate and PAp goals was not significant at the start of the study. However, the significant interaction ($\beta = .07$, $p<.05$) between perceptions of the teacher mastery climate and time suggests that the relationship between differences in students' average perceptions of the teacher mastery climate and PAp goals was significant at the middle and end of the study and became stronger over the course of the school year. Finally, no significant effects were found at the interclass level or in the interactions with time at the intraindividual level, suggesting that the relationships between climate perceptions and goals at this level persisted over the course of the school year.

3.3.4 Performance-avoidance goals. At the intraindividual, within-student changes in their perceptions of the teacher mastery climate ($\beta = .15$, $p<.01$), peer mastery climate ($\beta = .13$, $p<.01$) and peer performance climates ($\beta = .16$, $p<.01$) positively predicted the adoption of PAv goals at the end of the Autumn term. Students who reported positive changes in their perceptions of these climates reported being more likely to adopt goals that focused on avoiding doing worse than others.

At the interindividual level, differences in students' average perceptions of the teacher ($\beta = .14$, $p<.05$) and peer performance ($\beta = .34$, $p<.001$) climates positively predicted PAv goal adoption. Students who perceived their teacher and peers to value outperforming others and normative success more than did other students in their class were more likely to adopt goals that focused on avoiding doing worse than other students.

No significant effects were found at the interclass level and there were no significant interaction effects with time at any level suggesting that any relationships between climate perceptions and goals at the start of the study persisted over the course of the school year.

3.3.5 Effect Sizes. At the intraindividual level, the effect sizes ranged from .08 to .39, at the interindividual level from .03 to .45 and at the interclass level from .06 to .31, providing justification for the exploration of the effects of the perceptions of the motivational climate at all three levels of analysis.

4. Discussion

The current study sought to identify the temporal patterns of teacher and peer motivational climates and the predictive effects of these perceptions on the quality of students' motivation in PE over the course of the school year. This is the first study to apply the peer climate conceptualisation of Ntoumanis and Vazou (2005) to examine the concurrent effects of teachers and peers on the motivational climate to students' motivation in PE. It extends previous research in PE by presenting an analysis of the motivational climate at the intraindividual, interindividual and interclass level. Previously, research has almost exclusively examined perceptions of the motivational climate in terms of the differences between students in their perceptions (interindividual) or differences between classes in their perceptions (interclass). The inclusion of all three levels of analysis in the current study allowed intraindividual change to be estimated without being confounded by interindividual differences (Raudenbush & Bryk, 2002). The current study was therefore able to determine the effect of whether within-student changes, or differences between students, or differences between classes in their perceptions of the motivational climate had differential or unique influences on the quality of students' motivation in PE.

4.1 Changes in Perceptions of the Motivational Climate

Over the course of a school year, teacher and peer perceptions of the motivational climate exhibited different temporal patterns. Students perceived their teachers to be placing less emphasis on self-improvement and mastering of skills, but their peers to be placing more emphasis on intra-class conflict and intra-class competition and ability at the end of the school year. Although, initially this seems concerning, since there is substantial evidence of the beneficial effects of a mastery climate and negative effects of a performance climate on students' cognition, affect and behaviour (see Harwood et al., 2008 for an overview), this finding could reflect the influence of different activities within the curriculum on students' perceptions. Previous research on students' achievement goals, perceived competence and implicit theories of ability in PE has identified that motivational processes can be influenced by the activity that students are participating in (Spray & Warburton, 2003; Warburton & Spray, 2013). In the current study, students were participating in games-based activities at the first two measurement occasions and athletic activities at the final measurement occasion. The characteristics of these different activities may place more or less emphasis on mastery or performance cues due to the way in which they are taught, or the skills and abilities that are being employed during performance. Ability and skills in athletic activities may be more easily construed as basic and limited by genetic capability, which may not be the case in games-based activities where abilities and skills have to be co-ordinated and combined with tactics. Moreover, lessons in which games-based activities are being taught may focus on drills and skill development before applying them in a competitive situation at the end of the lesson. Whereas lessons in which athletic activities are being taught may involve teachers using races and competitions and more public and direct comparison to evaluate the technique of students. Consequently, the employment of different teaching styles and the characteristics of the activities may account for the variation in student's perceptions of the teacher and peer climate over the school year. This may also occur in classrooms in other

subject areas where a range of types of activities and participation structures are used. The inclusion of a variety of activities is an essential part of all curriculum areas for providing a high quality experience to all young people. This emphasises the dynamic nature of the motivational climate within the classroom and future research should consider how to incorporate and engage with this dynamic process to develop our understanding of changes in key motivational processes in all classrooms.

4.2 Teacher and Peer Influences on Student Motivation

The current study found that perceptions of both the teacher- and peer-created climates had an effect on the quality of student motivation in the classroom. Effects varied by the achievement goal under investigation and the level at which the effects were being assessed. This is consistent with previous research in the youth sport context that examined the influence of coach and peer climates on a range of outcomes (Ntoumanis et al., 2012). Moreover, in line with research on the dichotomous achievement goal orientations (Carr & Weigand, 2001), the study highlights that the quality of students' motivation in the PE classroom is influenced by, and matches the salient cues from both teachers and peers, reinforcing the importance of examining social agents, other than the teacher, to student motivation.

Across all four achievement goals, changes in students' individual perceptions and differences between students in their perceptions of the motivational climate accounted for most of the effect of teacher and peer climate on students' achievement goal adoption. Although effect sizes at the interclass level were suggestive of some between-class variability that could be explained, the results mostly indicated that any between-class differences in student's achievement goal adoption was not well explained by differences between classes in their perceptions of the motivational climate. The two exceptions to this were students whose class had higher average perceptions of the teacher mastery climate reported greater

adoption of both MAp and MAv goals. Furthermore, there was little to no effect of time on the nature of the relationship between climate perceptions and goals. For all but one instance, relationships between climate perceptions and achievement goal adoption established at the start of the study tended to persist over time. The exception to this was students whose average perception of the teacher mastery climate was higher than other students in the same class reported being more likely to adopt PAp goals over the course of the school year. This finding extends the research of Ommundsen (2006) to show that over time, in the PE context, where competence is so salient and public, the emphasis of teachers on improvement and mastering skills encourages students to also become concerned with outperforming others.

At the intraindividual and interindividual levels, the relationships between students' achievement goal adoption and climate perceptions were mostly consistent with theoretical propositions and previous research in PE (Cury et al., 2002; Halvari et al., 2011; Ommundsen, 2006). The importance of both teachers and peers to promoting adaptive student motivation in PE was apparent through the positive effects of perceptions of both teacher and peer climates on students MAp goal adoption. These findings extends previous research to show that the effects of the motivational climate on adaptive goal adoption occurs within and across individuals as well as at the class level. Exploring the concurrent effects of teacher and peer climates on adaptive goal striving in PE is important as neglecting one or other of these influences provides an incomplete picture of the dynamics of adaptive student motivation.

The findings for PAp and PAv goals were also consistent with theoretical predictions (Elliot, 1999, 2005) and previous research (Barkoukis, Thøgersen-Ntoumani, Ntoumanis & Nikitaras, 2007; Cury et al., 2002; Halvari et al., 2011; Ommundsen, 2006; Papaioannou et al., 2004). At the intraindividual and interindividual levels, when students perceived both their teachers and peers to emphasize outperforming others and normative success they were

more likely to adopt goals focusing on doing better than others in the class or avoiding doing worse than others in the class. Interestingly, the coefficients for peers were larger than those for teachers at both levels of analysis. It appears that in a subject where public evaluation is salient, the social agent that a student is comparing themselves to has a larger influence on whether a student focuses on outperforming others than when a teacher emphasises the same aspects. This highlights the importance of considering both teachers and peers on the dynamics of student motivation in the PE classroom.

Although it was anticipated that perceptions of the mastery climate might be associated with PAp goal adoption, interestingly this only occurred for peers at both the intraindividual and interindividual levels. When a student perceives their peers to value being one of the best they may realise that one way of being the best is to work hard and try to master the tasks or activities they are doing. MAp goals therefore allow the student to achieve what their peers' value. Similarly, the small positive relationship between perceptions of the performance climate and MAv goal adoption emerged only for peers despite the previous research on which these expectations were based being on perceptions of the teacher climate. Overall, the influence of teachers and peers on students MAv goal adoption varied depending on which level of analysis was being examined. For peers their influence was at the intraindividual level and through changes in perceptions of the emphasis on intra-class competition and ability and intra-class conflict. However, for teachers the influence was at the interindividual and interclass levels and through differences in perceptions of the teacher emphasis on mastery, effort and self-improvement. For this achievement goal in this study it appears that teachers may play a role in how pupils define competence in their achievement goal and peers may influence the valence of the mastery goal adoption. This aligns with Elliot's (1999) theorising that suggests that one of the ways that environmental variables such as perceptions of the motivational climate can influence achievement goal adoption is through channelling

the effects of an antecedent once it has been activated towards the adoption of a specific achievement goal, i.e., MAv as opposed to MAp.

However, as with the previous research in PE on the teacher climate and approach-avoidance goal adoption some inconsistencies emerged in this study, particularly for PAv goals. At the intraindividual level, changes in perceptions of both the teacher and peer mastery climate were associated with the greater adoption of PAv goals. It seems that when peers and teachers focus on effort and improvement, the public nature of competence and incompetence in PE, promotes a concern with avoiding doing worse than others, this may be especially true if the student is unsure whether they can improve at the activity or not. Since this is the first study to explore peer climate in relation to student motivation in PE, future research is needed to clarify these relationships. It should include additional antecedents of goals, such as perceived competence, to examine the independent and interactive influences of the teacher and peer climate on the quality of students' motivation in PE. Exploring these potential interactive effects of antecedents with climate perceptions may help explain some of the anomalous findings of the current study and the trends emerging in the sport and PE literature between PAp goals and perceptions of a mastery climate.

4.3 Conclusions and Future Research

The current study highlights the importance of both peer and teacher influences on the quality of student motivation in PE. Research on peer climate from the perspective of this study is limited and future research should seek to extend and corroborate the findings of the current study. One interesting avenue for future research to explore is the effects of congruent and incongruent teacher and peer climates on student motivation and outcomes. Examining how these combine to influence the learning environment and student motivation would provide a useful insight into student motivation in the classroom. Previous research has examined the effects of congruence and incongruence of students' perceptions of teacher's

goals and student achievement goals in English (Spera & Wentzel, 2003) and between students' goals and their perceptions of the motivational climate in PE (Papaioannou et al., 2004) and found some evidence for a person-environment fit hypothesis (Eccles & Midgley, 1989). Moreover, given that the current study adds further support to the literature on the influence of peers in shaping students' motivational orientations in the classroom, future research should consider the role of the teacher in shaping the peer climate. What specific practices can teachers use to influence the peer climate and promote an overall adaptive class climate? Exploring questions such as these in relation to teacher and peer climates could provide an important insight into the dynamics of student motivation in the classroom.

In summary, the current research makes a unique contribution to the literature by examining the concurrent effects of teachers and peers on the motivational climate in the PE classroom. The study examined changes over one school year at three different levels of analysis and found evidence that both teachers and peers are an important influence on the environmental cues about competence and success in the PE classroom. The importance of the learning environment to student motivation is well-documented in the literature but the current study shows that future research would benefit from incorporating peer as well as teacher influences if we are to create environments that optimise student motivation and can lead to wider health and academic benefits for young people.

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Appendix

Peer Climate Items

Improvement

1. Help each other improve
2. Offer to help their classmates develop new skills
3. Work together to improve the skills they do not do well
4. Teach their classmates new things

Relatedness Support

1. Make their classmates feel valued
2. Make their classmates feel accepted
3. Care about everyone's opinion

Effort

1. Encourage their classmates to try their hardest
2. Praise their classmates who try hard
3. Are pleased when their classmates try hard
4. Set an example on giving forth maximum effort
5. Encourage their classmates to keep trying after they make a mistake

Intra-Class Competition/Ability

1. Encourage each other to outplay their classmates
2. Care more about the opinion of the most able classmates
3. Try to do better than their classmates
4. Look pleased when they do better than their classmates
5. Want to be with the most able classmates

Intra-Class Conflict

1. Make negative comments that put their classmates down
2. Criticise their classmates when they make mistakes
3. Laugh at their classmates when they make mistakes

Approach-Avoidance Achievement Goals

Mastery-approach goals

1. My aim is to completely master the tasks and skills in this class.
2. I am striving to understand the tasks and skills in this class as thoroughly as possible.
3. My goal is to learn as much as possible

Mastery-avoidance goals

1. My aim is to avoid learning less than I possibly could.
2. I am striving to avoid an incomplete understanding of the tasks and skills I am doing.
3. My goal is to avoid learning less than it is possible to learn.

Performance-approach goals

1. My aim is to do well relative to other pupils.
2. I am striving to do well compared to other pupils.
3. My goal is to do better than the other pupils.

Performance-avoidance goals

1. My aim is to avoid doing worse than other pupils
2. I am striving to avoid doing worse than others.
3. My goal is to avoid doing poorly compared to others.

Table 1: Means, Standard Deviations and Cronbach's Alpha Coefficients

		Time 1			Time 2			Time 3		
Variable	Range	M	SD	α	M	SD	α	M	SD	α
Teacher Mastery Climate	1-5	4.11	.64	.80	4.08	.64	.81	4.02	.70	.86
Teacher Performance Climate	1-5	2.65	.78	.77	2.58	.83	.81	2.58	.81	.83
Peer Mastery Climate	1-7	4.91	1.14	.93	4.92	1.15	.94	4.86	1.15	.95
Peer Performance Climate	1-7	3.99	1.17	.83	4.05	1.14	.83	4.05	1.13	.84
Mastery-Approach goals	1-7	5.88	.95	.71	5.86	.96	.75	5.67	1.07	.75
Mastery-Avoidance goals	1-7	5.07	1.49	.70	4.91	1.56	.70	4.70	1.56	.72
Performance-Approach goals	1-7	5.09	1.28	.83	5.04	1.29	.84	4.85	1.35	.87
Performance-Avoidance goals	1-7	5.23	1.24	.76	5.15	1.31	.80	4.91	1.31	.82

Table 2: Bivariate Correlations at Each Wave of Measurement

Wave 1	1	2	3	4	5	6	7
1. Teacher Mastery	-						
2. Teacher Performance	-.19**	-					
3. Peer Mastery	.46**	-.09*	-				
4. Peer Performance	-.09*	.38**	-.35**	-			
5. MAp goals	.40**	-.06	.35**	.05	-		
6. MAv goals	.17**	-.02	.12**	.08*	.38**	-	
7. PAp goals	.10**	.35**	.10*	.44**	.43**	.28**	-
8. PAv goals	.16**	.25**	.08	.37**	.41**	.39**	.75**
Wave 2	1	2	3	4	5	6	7
1. Teacher Mastery	-						
2. Teacher Performance	-.27**	-					
3. Peer Mastery	.42**	-.10*	-				
4. Peer Performance	-.08	.49**	-.33**	-			
5. MAp goals	.49**	-.15**	.35**	-.01	-		
6. MAv goals	.21**	.03	.06	.10*	.34**	-	
7. PAp goals	.13**	.37**	.08	.36**	.36**	.29**	-
8. PAv goals	.12**	.28**	.03	.32**	.35**	.43**	.75**
Wave 3	1	2	3	4	5	6	7
1. Teacher Mastery	-						
2. Teacher Performance	-.35**	-					
3. Peer Mastery	.54**	-.26**	-				
4. Peer Performance	-.17**	.53**	-.31**	-			
5. MAp goals	.49**	-.23**	.38**	-.03	-		
6. MAv goals	.18**	-.01	.15**	.16**	.35**	-	
7. PAp goals	.10*	.36**	.04	.46**	.39**	.28**	-
8. PAv goals	.10*	.27**	.04	.43**	.37**	.39**	.77**

*p<.05; **p<.01

Table 3: Multilevel Models of Perceptions of the Motivational Climate on Student Achievement Goal Adoption.

	Achievement Goal											
	MAp			MAv			PAp			PAv		
Predictor	β	(SE)		β	(SE)		β	(SE)		β	(SE)	
Intraindividual level												
Initial Status												
Intercept	6.01	0.05	***	5.15	0.11	***	5.21	0.07	***	5.31	0.08	***
Teacher Mastery	0.17	0.04	***	0.06	0.07		0.05	0.05		0.15	0.05	**
Teacher Performance	-0.03	0.03		0.02	0.07		0.10	0.04	*	0.06	0.05	
Peer Mastery	0.14	0.03	***	0.11	0.07		0.20	0.04	***	0.13	0.05	**
Peer Performance	0.09	0.03	*	0.13	0.06	*	0.18	0.04	***	0.16	0.05	**
Rate of Change												
Intercept	-0.14	0.03	***	-0.20	0.05	***	-0.16	0.03	***	-0.17	0.04	***
Teacher Mast x Time	0.05	0.03		0.07	0.06		0.06	0.04		0.00	0.04	
Teacher Perf x Time	0.01	0.03		0.04	0.05		-0.01	0.04		0.04	0.04	
Peer Mastery x Time	0.00	0.03		0.04	0.06		-0.07	0.04		-0.02	0.04	
Peer Perf x Time	-0.01	0.03		0.01	0.05		0.04	0.04		0.04	0.04	
Interindividual level												
Initial Status												
Teacher Mastery	0.15	0.04	**	0.25	0.08	**	-0.03	0.06		0.05	0.06	
Teacher Performance	-0.06	0.05		0.00	0.08		0.22	0.06	***	0.14	0.06	*
Peer Mastery	0.17	0.05	***	-0.04	0.09		0.18	0.06	**	0.06	0.07	
Peer Performance	0.09	0.05		0.02	0.09		0.32	0.06	***	0.34	0.07	***
Rate of Change												
Teacher Mast x Time	0.04	0.03		-0.08	0.05		0.07	0.04	*	0.01	0.04	
Teacher Perf x Time	-0.01	0.03		-0.07	0.06		0.05	0.04		0.05	0.04	
Peer Mast x Time	-0.01	0.03		0.00	0.06		-0.03	0.04		0.06	0.12	
Peer Perf x Time	0.04	0.03		0.10	0.06		0.02	0.04		0.05	0.04	
Interclass level												
Initial Status												
Teacher Mastery	0.18	0.07	*	0.30	0.15	*	0.00	0.10		0.06	0.12	
Teacher Performance	0.53	0.31		-0.23	0.63		0.37	0.42		0.47	0.48	
Peer Mastery	0.01	0.07		-0.14	0.13		0.05	0.09		0.03	0.10	
Peer Performance	-0.06	0.07		0.16	0.15		0.12	0.10		0.02	0.12	
Rate of Change												
Teacher Mast x Time	0.06	0.04		-0.10	0.07		0.05	0.05		0.02	0.05	
Teacher Perf x Time	-0.25	0.16		0.10	0.31		-0.10	0.20		-0.36	0.22	
Peer Mas x Time	-0.08	0.03		0.10	0.06		-0.03	0.04		-0.07	0.05	
Peer Perf x Time	-0.03	0.04		-0.10	0.07		-0.02	0.05		0.01	0.05	

Note: Perf = performance; Mast = mastery; *p<.05; **p<.01; ***p<.001

Highlights

- Both teacher and peer climates influenced student motivation in PE.
- Within-person changes in perceptions of teacher and peer climates accounted for most of the influence on student motivation in PE.