

A review of motivational climate in physical activity

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Here we provide, within a social-cognitive framework, a critical review of research on the motivational impact of different psychological climates in physical activity. Motivational, cognitive, affective and behavioural outcomes are considered in sport, school physical education and exercise. We first review laboratory and field studies that tried to manipulate the perceived structures of motivational environments and to examine the subsequent outcomes on participants' cognitive and affective responses. Then we discuss studies influenced by the work of Ames in classroom settings and involving questionnaires to measure individuals' perceptions of 'motivational climates'. The impact of mastery and performance climates on various indices of motivation is narratively reviewed, and statistically estimated effect sizes from 14 studies ($n = 4484$) are presented as supporting evidence. We conclude that a mastery motivational climate is associated with more adaptive motivational patterns, while a performance climate is linked with less adaptive or maladaptive motivational and affective responses. Future research should determine the personal and situational variables that can moderate the impact of such relationships. Furthermore, a broader perspective is proposed, to understand the creation of perceived motivational climates, which is based on the integration of political, cultural, coaching and parental influences.

Keywords: effect size, mastery climate, motivation, performance climate.

Introduction

It is widely believed within competitive sport that one or two key individuals in leadership roles can create an environment or climate that is associated with success. Managers (coaches) in British football are hired and fired with what some see as alarming frequency. Presumably, the higher turnover of such 'leaders' is caused by employers believing that managers 'cause' success or failure. In addition, teachers of physical education, or exercise class leaders, are often credited with creating a 'good' or productive ethos in their classes. Such observations serve as reminders that exercise and sport psychology research needs to account for the role of leaders and the perception participants might have of the psychological climate created by those in leadership roles.

Recently, an increasing number of studies of motivational patterns in sport, exercise and school physical

education settings have used a social cognitive framework (see Roberts, 1992; Duda, 1993). The dominant perspective has been the goal orientations approach and related themes, such as motivational climates (e.g. Ames, 1984; Dweck and Leggett, 1988; Nicholls, 1989). These are social-cognitive perspectives, since they examine how individuals cognitively process and develop their views about achievement under various social contexts and influences (see Roberts, 1992; Bandura, 1997). Central to achievement motivation within such a framework is how people interpret achievement and how they perceive the social context within which they are operating. Therefore, to understand the likely influence of different motivational climates, we must first consider the meaning individuals attach to achievement. This necessitates commenting on the nature of individual achievement goals.

According to the goal orientations literature, individuals strive to demonstrate competence in achievement settings through the adoption of two distinct goals. When evaluation of performance is based on normative standards – that is, when success and failure are defined in comparison to the performance of others –

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an ego goal orientation is adopted (Nicholls, 1989). Alternatively, when evaluation of performance is self-referenced – that is, when it is based on personal improvement and learning criteria – a task goal orientation is adopted.

In the theoretical framework of Nicholls (1989), differences in goal orientations reflect differences in the conception of ability. Specifically, ego orientation is based on a differentiated conception of ability, where effort and ability are clearly distinguished as causes of outcomes. However, task-oriented individuals do not differentiate effort and ability, and they believe that improvement through effort implies ability. As Ames (1992a) has contended, such goals affect the *amount* of motivation of individuals less than the *quality* of their motivation. Specifically, the study of goal orientations concerns the understanding of the causes, the development and the consequences of motivated behaviour, rather than the amount of motivation. Different behavioural, cognitive and affective outcomes have been noted for task- and ego-oriented individuals (for a comprehensive review, see Duda, 1993).

Treasure and Roberts (1995) have argued for the need to examine the joint influence of dispositional goals and motivational climates on the cognitive and affective responses of individuals in physical activity settings. Such a perspective, which is consonant with Nicholls' (1989) and Dweck and Leggett's (1988) views, suggests that whether individuals are task- or ego-involved in a particular situation (goal involvement) is determined by the joint influence of their dispositional goal orientations and social climate factors. In other words, predispositional perspectives on achievement, together with influences from salient social agents, determine the personal meaning of achievement and the cognitive, affective and behavioural patterns that individuals exhibit at any particular time.

With respect to the situational antecedents of goal involvement, much of our knowledge stems from the work of Ames (1984, 1992a,b,c) in academic settings. Ames's work provides an important context for physical activity research on motivational climate. Specifically, Ames (1992a) distinguished between mastery (task) and performance (ego) perceptions of motivational climates, which she defined in line with Epstein's (1989) work. Specifically, based on previous findings, Epstein (1989) suggested that there are six variables that can help teachers organize classroom instruction and interactions. These six achievement structures are (see Table 1): Task (design of tasks), Authority (location of decision-making), Recognition (distribution of rewards), Grouping (manner and frequency of grouping), Evaluation (standards for performance) and Time (pace of learning). The initial letters of the six structures create the acronym TARGET. Furthermore, Ames

Table 1 Descriptions of mastery and performance climates in accordance with the TARGET structures (adapted from Ames, 1992b)

Mastery	Performance
Tasks	
Challenging and diverse	Absence of variety and challenge
Authority	
Students are given choices and leadership roles	Students do not take part in the decision-making processes
Recognition	
Private and based on individual progress	Public and based on social comparison
Grouping	
Promotion of cooperative learning and peer interaction	Groups are formed on the basis of ability
Evaluation	
Based on mastery of tasks and on individual improvement	Based on winning or out-performing others
Time	
Time requirements are adjusted to personal capabilities	Time allocated for learning is uniform to all students

(1992b) has argued that the subjective meaning or perception of the motivational environment is a critical factor in predicting cognitive and affective components of motivation.

If students are involved in decision-making, their grouping is not based on ability, success is defined and evaluated as individual effort and improvement, and discovery of new learning strategies is encouraged, then it is likely that the students will perceive their classroom to be mastery-oriented (Ames, 1992b). Perceptions of a mastery climate in classrooms have been associated with adaptive motivational patterns, such as use of effective learning strategies, positive attitudes towards the activity and increased effort (Ames and Archer, 1988). In contrast, if the focus of learning is on inter-personal comparison, evaluation is based on normative standards, grouping of students is based on ability and the time allocated for learning is inflexible, then it is likely that the students will perceive the climate as performance-oriented. In such cases, Ames and Archer (1988) have found that students are more likely to show maladaptive motivational responses (e.g. attribution of failure to lack of ability, use of ineffective strategies, focus on ability) and decreased motivation (e.g. low effort and persistence) or even learned helplessness (Dweck and Leggett, 1988).

Ames (1992a) has argued that different learning environments can give different meanings and views on academic achievement and, subsequently, influence students' learning. Therefore, it is important that students' perceptions, or theories on achievement, are assessed, as they can convey a great deal of information concerning investment in achievement contexts, such as classrooms and physical activity settings.

In view of the theoretical arguments of Ames (1992a,b,c), and research findings in classrooms (e.g. Ames and Archer, 1988), it is important to understand how different structures of the motivational climate facilitate the development of adaptive or maladaptive motivational processes in physical activity, how these structures operate and how they can be altered through intervention programmes. As we will try to show, the climate is a critical factor to address if we are to understand motivational investment. Climates can influence the effort, persistence, cognitions, emotions and behaviour of individuals in physical activity contexts.

Here we provide a critical review of studies that have examined the motivational impact of different climates in physical activity. When we refer to the perceived meaning (perception) of the psychological climate, we use the term 'motivational climate', in accordance with Ames's (1992b) terminology. However, the psychological climate is not exclusively a 'motivational climate' in the sense used by Ames. In addition, as we have already alluded, environments can be established by group leaders but not necessarily be assessed. We believe these also to be important contexts to study.

The articles reviewed were selected through targeted computer and journal searches. The computer search used SPORTdiscus, PsychLIT, First Search and BIDS databases. The journals considered likely to contain relevant articles – *International Journal of Sport Psychology*, *Journal of Sport and Exercise Psychology*, *Journal of Sport Behavior*, *Pediatric Exercise Science*, *Quest*, *Research Quarterly for Exercise and Sport* and *The Sport Psychologist* – were also examined from 1984 to the present. Although the studies differed in their theoretical framework, design characteristics and method of evaluating climate features, none was excluded if the impact of psychological climates of physical activity settings on various motivational indices was examined.

We first look at intervention studies that tried to manipulate and impose different climates based either on mastery- or performance-oriented instructions. The purpose of these studies was to examine the relation between different motivational structures and participants' motivational outcomes. We then review studies that, following contemporary social cognitive theories and in particular the work of Ames (1984, 1992a,b,c) in classrooms, measured individuals' *perceptions* of the

motivational climate in physical activity. An overview is given of the different measures of motivational climates developed for sport and school physical education contexts, and how their subscales relate to various indices of motivation. To indicate the magnitude of the relationships between different motivational climates and cognition and affect, the effect size of such relationships, taken from a few studies, is provided. Finally, proposals for future research are offered.

Manipulating psychological environments in physical activity

Many studies on motivation have manipulated the psychological structures of physical activity and examined the subsequent outcomes on various motivational indices. Some of these studies have made direct (e.g. Theeboom *et al.*, 1995) or indirect (e.g. Marsh and Peart, 1988) references to the work of Ames (1984, 1992a,b,c) on motivational climates. Others, however (e.g. Grieve *et al.*, 1994), did not relate their work to Ames's theoretical framework.

Duda (1993) pointed out that different goal structures of the sport or laboratory environment have been created by providing participants with normatively referenced or self-referenced feedback. We emphasize that goal structures are only one aspect of the environment open to intervention and change. This section contains two subsections, in which the motivational consequences of short-term and of long-term interventions on psychological climate in sport, school physical education and exercise are examined separately.

Short-term interventions

All studies reviewed in this subsection used cross-sectional designs. Specifically, the researchers gave instructions to participants with the intention of creating structures that would emphasize competition and interpersonal comparison or personal effort and improvement. In a field experiment, Duda and Chi (1989) created ego- and task-involving game conditions in one-on-one basketball. The study focused on the impact of the two experimental conditions on performance attributions and post-performance ratings of perceived ability of male American intramural basketball players. In the ego-involving condition, the focus was on winning and on public recognition of performance; in the task-involving condition, individual effort and improvement in techniques were emphasized. The results showed that, in the task-involving condition, participants used performance attributions (personal effort, personal ability, opponent's ability, luck) to judge if

performance was *perceived* as successful or unsuccessful; in the ego-involving condition, performance attributions were used to judge the *objective* outcome (win or loss). Furthermore, only in the ego-involving condition was there a relationship between perceived competence and objective outcome; in the task-inducing condition, perceptions of competence were unrelated to objective success. In the task-induced condition, participants used subjective criteria to judge the adequacy of their competence. One conclusion from this study is that the task-inducing instructions were related to more adaptive motivational patterns than the ego-inducing ones. The independent, and potentially important, contribution of goal orientations and perceived competence on these outcomes was not assessed.

One experiment that exemplifies the need to assess perceived competence is that by Orgell and Duda (1990), who examined the impact of task- versus ego-involving instructions on intrinsic motivation in a golf-putting task. In the task-involving condition, the focus was again on personal effort, whereas in the ego-involving condition, the evaluation was based on interpersonal comparison. The results showed that female golfers spent significantly more time in a free choice period of practice after the experiment when they had previously been allocated to a task- rather than an ego-involving condition. These differences in time allocation were not found among male golfers; Orgell and Duda (1990) attributed this to the males being higher in perceived ability and, therefore, not influenced negatively by the ego-involving instructions. Orgell and Duda's (1990) claim is supported by the findings of Hall (1990).

Vallerand *et al.* (1986) also provided convincing evidence of the detrimental role of competitive-oriented climates on intrinsic motivation. Specifically, they found, in line with Orgell and Duda (1990), that boys who had been assigned to a competitive condition spent significantly less time on a balance stabilometer, when given a choice, than those in the mastery-oriented condition. In explaining these results, Vallerand *et al.* (1986) argued that competitive structures are motivationally detrimental, since they undermine the self-determination of individuals. We discuss this later, when we consider possible mechanisms for the effects of motivational climates.

Research on the inducement of task- and ego-involving structures has not always provided support for theoretical predictions. For example, Walsh *et al.* (1992), in a motor skill experiment, used instructions designed to invoke task and ego goal involvement in undergraduate physical education students. In the task-involving condition, the students were encouraged to develop new strategies to master the new skill, whereas in the ego-involving condition, the students were told

that their performance would be judged against fixed criteria. Contrary to expectation, the group with low perceived competence in the ego-involving condition did not differ significantly in terms of negative affect and task persistence from the high perceived competence group in the same condition, or from both the high and low perceived competence groups in the task-involving condition. One possible explanation for these results is that Walsh *et al.* tested the interaction between perceived competence and situational structures, while achievement goal theories refer to the interaction between perceived competence and goal perspectives. Thus Walsh *et al.* assumed that the situational structures of the experiment had overridden the goals held by the participants. Experimenters' instructions do not always manage to set aside these goals (see Giannini *et al.*, 1988).

Short-term interventions: Conclusions. Studies on short-term interventions show that, when mastery rather than performance-oriented structures are emphasized, individuals in physical activity settings are more likely to use subjective criteria to judge their competence, to exert more effort, to attribute their performance to effort, and to be more intrinsically motivated. It is possible that the setting in some of the studies reviewed did not elicit much importance or value for the activity, similar to that experienced in more realistic sport contexts. Therefore, the above results should be tested further in more ecologically valid physical activity settings.

Long-term interventions

To observe the psychological and behavioural changes from implementing different reward structures, longer-term interventions than those just reviewed are also required. For example, Marsh and Peart (1988) conducted a 14-session intervention study of the effects of competitive and cooperative aerobic programmes on the physical fitness and multidimensional self-concepts of adolescent Australian females. Although they did not associate the terms competitive and cooperative structure with the contemporary theoretical framework of achievement goal perspectives, the conceptualization of those terms was closely related to the work of Ames (e.g. Ames and Ames, 1981; Ames, 1984). Marsh and Peart (1988) showed that physical fitness improved in both the competitive and cooperative programmes. The participants in the cooperative programme reported improvements in perceived physical ability and perceived physical appearance, whereas those who were assigned to the competitive programme reported a decrease in these self-perceptions.

Lloyd and Fox (1992) implemented two teaching approaches in a 6-week aerobic fitness programme delivered to a small group of adolescent females. The first approach emphasized peer and normative comparisons, the public recording of performances, and in general had most of the structures of a climate that Ames (1992b) had characterized as performance-oriented. The second approach was intended to promote a mastery environment by discouraging comparison and focusing on personal improvement. The results showed that, in the mastery condition, participants exhibited greater enjoyment and motivation regardless of their ego orientation. Furthermore, low ego participants in the performance condition increased significantly their ego orientation, whereas high ego participants in the mastery condition lowered their ego orientation by the end of the intervention.

Lloyd and Fox's (1992) study is the only one, to our knowledge, to show changes in *goal orientations* in conjunction with manipulation of the climate. Although these results may be of interest, the stability of goal orientations is yet to be established. It is possible that children and young adolescents, who may not have clearly formulated their meanings of achievement, may be more susceptible to the influences of social climate than adults (Treasure and Roberts, 1995).

Theeboom *et al.* (1995) conducted a 3-week intervention study in an organized sports programme. The special characteristic of this study was that the authors adapted and manipulated the TARGET structures, which, according to Epstein (1989), define an achievement climate. These achievement dimensions are important because they provide a comprehensive framework for researchers and coaches to organize a wide range of motivational principles and strategies that are consistent with a mastery climate (Ames, 1992c). Using the TARGET framework, researchers can examine how these structures relate to each other and how they can be modified or strengthened to emphasize a mastery dimension in the climate.

Theeboom *et al.* (1995) showed that a mastery motivational climate can offer more positive experiences for children as they learn new skills (martial arts). Specifically, the children in the mastery climate reported greater enjoyment, perceived competence and intrinsic motivation. It is a pity that the children's perceptions of the climate were not assessed, since these could have influenced the meaning attached to the situation and could have resulted in different motivational outcomes.

Long-term interventions: Conclusions. The intervention studies reviewed in general verify the theoretical predictions of the positive influence of a mastery motivational

climate and the negative influence of a performance climate on participants' cognition, affect and behaviour. In implementing a mastery climate, researchers have emphasized individual effort and improvement of techniques, personal feedback, self-directed learning, enjoyment, discouraging comparison and the development of efficient strategies to master new tasks. In competitive or performance-oriented conditions, the focus has been on winning, public recognition of performance, normative feedback and evaluation based on normative standards and interpersonal comparison.

The methodological and theoretical drawbacks of these studies include a lack of control for the independent effect of goal orientations on motivational outcomes (e.g. Duda and Chi, 1989), and the use of cross-sectional designs to make inferences about the long-term motivation of individuals (e.g. Vallerand *et al.*, 1986). Furthermore, it would have been desirable if these studies had provided evidence for the magnitude of the effects in different achievement structures, rather than an exclusive reliance on levels of significance (Thomas *et al.*, 1991).

Another limitation to these studies was the assumption that participants uniformly interpret the instructions that they are given. The focus of these studies was on the goal structure that was created and not on the perceptions of the achievement climate held by the participants. Ames (1992a) noted that students in a classroom environment have different prior experiences that can affect the interpretation of the same teaching instructions. Therefore, it would have been better if participants' perceptions of the situationally induced goal structure had been measured. It had been suggested to us that these studies should not be criticized for not measuring participants' perceptions, since this was not their main focus. However, we believe that participants' perceptions could have had a major influence on the results of these studies and, therefore, they should have been measured and statistically controlled.

The interpretation of coach-athlete or teacher-student interactions in sport or physical education settings, and the motivational climate created, may need to be evaluated using domain-specific instruments. Although a case could be made for cross-domain climate instruments, particularly at a more global level of analysis, the unique characteristics and tasks in different settings can affect perceptions of the motivational climate. This may require domain-specific scales of perceived climate (Biddle *et al.*, 1995). In the next section, we review studies that have developed questionnaires to measure perceptions of motivational climate in varying contexts and how these relate to different motivational outcomes.

The development of measurement instruments of motivational climates

In physical activity research, the assessment of motivational climates has been conducted primarily using questionnaires. As Ames (1992a) and Epstein (1989) have noted, there are certain elements or structures (i.e. TARGET) within motivational climates that individuals find salient. Since these structures have been found to have different effects on the emotions, cognitions and motivation of individuals, it is important that researchers develop appropriate tools to measure them. Psychometrically sound measurement instruments can improve our knowledge and help the effective organization of intervention strategies. In the next two subsections, sport and school physical education settings are addressed separately, as they represent different physical activity contexts. This is because they are likely to differ in terms of voluntary participation, reasons for participation, variability in physical competence, meaning attached to involvement and types of social influences in operation (e.g. parent, coach, teacher).

Climate measures in sport

Various questionnaires have been developed to measure perceptions of mastery and performance motivational climates in sport settings. In our review, we have included studies that developed and psychometrically tested these questionnaires (see Table 2).

The Perceived Motivational Climate in Sport Questionnaire-1 (PMCSQ-1) was the first inventory used to measure perceptions of sport motivational climate. This questionnaire was developed by Seifriz *et al.* (1992) using American male basketball players. The authors created an initial pool of 106 items, which were later reduced to 40 by a panel of eight raters who evaluated the face validity of the items. The remaining items were subjected to exploratory factor analysis that suggested two factors with nine and 12 items, respectively. The two factors were called 'mastery climate' and 'performance climate', which were shown to have satisfactory internal consistency (all $\alpha > 0.80$). The mastery subscale includes items that describe hard work, skill improvement and the viewing of mistakes as part of the learning process, whereas the performance subscale includes items that emphasize outplaying team-mates, punishment for mistakes and favouring the 'stars' in a team.

Seifriz *et al.* (1992) showed that perceptions of a mastery climate among the basketball players were positively related to reported enjoyment and the belief that effort leads to success. On the other hand, perceptions of a performance climate were linked to the view that superior ability leads to success. Although these

results provide initial support for the construct and predictive validity of the PMCSQ-1, other forms of validity (e.g. convergent and discriminant), as well as the test-retest correlation of the questionnaire, were not examined.

In a further attempt to test the construct validity of the PMCSQ-1, Walling *et al.* (1993) studied a group of young American athletes participating in various sports. The construct validity of the PMCSQ-1 was tested using a confirmatory factor analysis, which is a necessary addition to the exploratory factor analysis conducted by Seifriz *et al.* (1992). The results revealed that, to have a satisfactory fit of the hypothesized two-factor model (mastery and performance climate) to the data, several errors of measurement had to be correlated. This correlation implies that other lower-order factors should be taken into account when describing the mastery and performance dimension. This problem has occurred with other instruments assessing climate. It appears that mastery and performance dimensions are fairly robust; however, identifying consistent sub-dimensions remains a priority for future research. We discuss this later.

Kavussanu and Roberts (1996), using the PMCSQ-1, found that perceptions of a high mastery climate in males were positively related to enjoyment, effort and perceived competence, and inversely related to tension. Ebbeck and Becker (1994) also reported that perceptions of a high mastery climate and a low performance climate were linked to high task orientation. In the latter study, the ego orientation of the players was significantly better predicted by the perceived parental goal orientation than by the perceived climate in the team. This suggests it is important to assess different sources of psychological influences on participants' motivation in physical activity. Climate items reflecting parental influence may provide a more comprehensive view of the motivational climate of sport teams.

Using a longitudinal design, Williams (1998) found that motivational climate is not a major predictor of goal orientations. Perceptions of a mastery climate accounted for only 11%, and those of a performance climate only 3%, of the changes in task orientation from early to late season in 127 female softball players. Furthermore, none of the climate dimensions predicted seasonal changes in ego orientation. Discussing these findings, Williams emphasized the need to look at wider socializing agents for goal orientations.

To provide a more comprehensive measure, Newton and Duda (1993) developed a multi-dimensional questionnaire, the Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2). Based on previous academic and sport research, Newton and Duda (1993) developed a pool of 300 additional items. Similar to the PMCSQ-1, the face validity of the item pool was judged

Table 2 Summary of studies measuring motivational climates in sport

Study	Sample	Climate measure	Aims	Results	Key points/critique
Seifriz <i>et al.</i> (1992)	105 male basketball players	PMCSQ-1	To determine the relationship of perceived motivational climate to intrinsic motivation and attributional beliefs	<ol style="list-style-type: none"> 1. Perceptions of a mastery climate positively related to reported enjoyment and the belief that effort leads to achievement 2. Perceptions of a performance climate were associated with the view that superior ability causes success 	Perceived motivational climates and dispositional goal orientations had very little variance in common
White <i>et al.</i> (1992)	210 adolescents from a variety of sports	PIMCQ-1	To examine the factor structure of the PIMCQ-1	<ol style="list-style-type: none"> 1. A three-factor structure emerged: worry-conducive climate, success without effort climate and learning-oriented climate 2. Differences between the sexes emerged in the perception of motivational climate 	Weak support for the psychometric validity of the new instrument
Newton and Duda (1993)	202 female volleyball and basketball players	PMCSQ-2	To investigate the construct and predictive validity of the PMCSQ-2	<ol style="list-style-type: none"> 1. Exploratory factor analysis showed that the PMCSQ-2 comprised three mastery and three performance factors 2. Perceptions of mastery climate were positively related with task orientation; perceptions of performance climate were positively related with ego orientation 	The multidimensional character of the PMCSQ-2 reflects the views of Ames (1992a,b,c) and Epstein (1989) on motivational climates
Walling <i>et al.</i> (1993)	169 young recreational athletes	PMCSQ-1	To examine the construct and predictive validity of the PMCSQ-1	<ol style="list-style-type: none"> 1. Confirmatory factor analysis indicated an acceptable fit of the data with the hypothetical two-factor model only when measurement errors were correlated 2. Perceptions of mastery climate were positively and negatively related to measures of satisfaction and worry respectively. The inverse pattern of results emerged when perceptions of performance climate were examined 	<ol style="list-style-type: none"> 1. Performance and mastery climates were not found to be independent 2. The addition of other items in the questionnaire may aid in accounting for greater unexplained variance in the model

Table 2—continued

Study	Sample	Climate measure	Aims	Results	Key points/critique
Ebbeck and Becker (1994)	166 adolescent soccer players	PMCSQ-1	To examine the extent to which perceived social, contextual and personal factors predicted the goal orientations of youth sport participants	<ol style="list-style-type: none"> Higher scores on perceived mastery climate as well as lower scores on perceived performance climate were associated with a higher level of task orientation. Perceived motivational climate was not related to ego orientation No differences between the sexes were found 	Perceived parent goal orientations and not motivational climates were the dominant predictors of players' goal orientations
White (1996)	204 female volleyball players	PIMCQ-2	To examine the relationship between goal orientation and perceptions of parental motivational climate	<ol style="list-style-type: none"> Perceptions of a success without effort climate were significantly correlated with ego orientation Perceptions of a learning/enjoyment climate were significantly associated with task orientation 	PIMCQ-2 is not much different from the PIMCQ-1 to represent a significant improvement
Kavussanu and Roberts (1996)	285 beginners in tennis classes	PMCSQ-1	To examine the relationships between perceived motivational climate, intrinsic motivation and self-efficacy in physical activity classes	<ol style="list-style-type: none"> Males had significantly higher perceptions of performance climate than females Perceptions of a high mastery climate in males and females were associated with higher perceived competence, enjoyment and effort, and lower tension 	One of the few studies that examined differences between the sexes in the perceptions of motivational climates. However, the potential implications of such differences in intervention programmes should have been discussed
Newton and Duda (unpublished)	385 female volleyball players	PMCSQ-2	To examine via the use of structural equation modelling the hypothesized hierarchical factor structure of the PMCSQ-2	<p>Confirmatory factor analysis showed that the PMCSQ-2 comprises two first-order (mastery and performance) and six second-order factors (effort/improvement, cooperative learning, important role, intra-team rivalry, unequal recognition, punishment for mistakes)</p>	<ol style="list-style-type: none"> If motivational climates are multifaceted, then applied sport psychologists and coaches should examine which aspects of the environments need modification and for what reason Although the PMCSQ-2 represents a development beyond PMCSQ-1, there is still room for improvement of its structure

White (1998)	279 adolescents from a variety of sports	PIMCQ-2	To examine the combined effects of task and ego goal orientations on perceptions of parental motivational climate	<ol style="list-style-type: none"> 1. Sport participants high in task and low in ego orientation perceived a mastery climate 2. Sport participants high in ego and low in task orientation perceived a performance climate 	Because of similarities in the content of the items, such significant relationships could be partially attributed to method effects. This argument is also applicable to all similar studies
Goudas (1998)	100 Greek male basketball players	PMCSQ-1	To examine whether perceived competence would interact with motivational climate in predicting intrinsic motivation	<ol style="list-style-type: none"> 1. Intrinsic motivation was predicted by perceptions of a mastery climate and was unrelated to a performance climate 2. Interactive effects between perceived competence and motivational climate were not found 	According to the achievement goal theories, perceived competence is more likely to interact with ego orientation than with motivational climate
Ommundsen <i>et al.</i> (1998)	148 Norwegian university athletes	PMCSQ-1	To investigate whether achievement-related cognitions and affect would relate to different dimensions of motivational climate	<ol style="list-style-type: none"> 1. Mastery climate was related to controllable criteria as a source of satisfaction, to learning as an outcome of practice, and to a view of sport as being important for developing lifetime skills 2. Performance climate was related to ego orientation and to a view of sport as a means for increasing one's social status 	Although the authors stated their support for the interactional approach to achievement motivation, their analysis did not examine any interactive effects
Liukkonen <i>et al.</i> (1998)	557 adolescent Finnish male soccer players	PMCSQ	To examine the predictions of Roberts' (1992) model of motivation	Of all the variables in Roberts's (1992) model, mastery climate had the strongest link with enjoyment	Players who perceived their climate as mastery-oriented reported high enjoyment, regardless of the level of their perceived competence

Note: All participants in the above studies were from the USA unless stated.

by a group of experts who agreed on the retention of 42 items. These items were then administered to 225 American female basketball and volleyball players. To test the construct validity of the PMCSQ-2, an exploratory factor analysis was conducted that produced a 30-item instrument of six factors. These factors have acceptable internal reliabilities and some overlap with the climate dimensions identified by Ames (1992a,b,c). The first three factors were termed effort/improvement, important role and cooperative learning and constituted a mastery climate; the other three factors were labelled unequal recognition, punishment for mistakes and intra-team member rivalry and reflected a performance climate. In other words, mastery climate was associated with environments in which athletes perceive they have an important role in the team, are rewarded in relation to their effort and improvement, and help each other learn new tasks. In contrast, performance climate was associated with environments in which recognition and evaluation was based on ability, players are punished for their mistakes and competition among the members of the same team is considered appropriate.

To provide further support for the factorial structure of the PMCSQ-2, Newton and Duda (unpublished results, University of New Orleans) used confirmatory factor analysis to test its proposed hierarchical model structure with a sample of 385 American female volleyball players. Using several statistical criteria, they showed that the hierarchical structure of the PMCSQ-2 (mastery and performance second-order factors underpinned by six first-order factors) fit the data better than the six subscale non-hierarchical or the two scale PMCSQ-1 measurement models.

It is clear that more research is required into the impact of motivational climates on various affective, cognitive and behavioural responses. To increase our knowledge in this area, valid and reliable measures of motivational climates are essential. The PMCSQ-2 reflects a multidimensional conceptualization of the sport environment and, in that sense, may be a better tool than the original questionnaire, which measured only a few aspects of motivational climates. Although the PMCSQ-2 reflects a multidimensional conceptualization and measurement of motivational climates, it is limited in the sense that it measures only some aspects of the TARGET structures. New items could be added that reflect athletes' perceptions of choice, involvement in decision-making, design of tasks and pace of learning.

As stated above, parents like coaches can play an important role in the creation of different perceptions of motivational climates. To assess children's perceptions of the motivational climates initiated by parents in the sport domain, White *et al.* (1992) developed the Parent-Initiated Motivational Climate Questionnaire-1 (PIMCQ-1) using 210 young American sports parti-

cipants. This questionnaire consists of 14 questions adapted from a questionnaire that Papaioannou (1994) developed to measure perceptions of motivational climate initiated by school physical education teachers. The same 14 questions were asked for both mothers and fathers and were subjected to exploratory factor analysis separately for each parent. The results showed that the factor structure was similar for each parent. The questionnaire had acceptable internal consistencies (all $\alpha > 0.75$) and comprised three factors: worry-conducive climate, success without effort climate and learning-oriented climate. As White *et al.* (1992) contended, the first two factors reflect a performance climate, whereas the third factor represents a mastery climate emphasized by the dominant (in terms of influence) parent.

White *et al.* (1992), however, offered only weak support for the validity of the PIMCQ-1. The initial pool of items was small and was based on reworded items that reflected teachers' behaviours. More items that reflect unique aspects of parent-child interactions could be added, a suggestion endorsed by White *et al.* (1992). The new items could reflect the nature of parents' emotional involvement, encouragement and interest in their children's physical activities. Furthermore, this questionnaire assumes that one of the two parents exert a greater influence on children's motivation. It would be relevant to know what the motivational consequences for children are when the other parent has contradictory views on achievement.

The PIMCQ-1 has been expanded to 36 items in an unpublished study by White and Duda (cited in White, 1996), with new items reflecting feelings of enjoyment. In an exploratory factor analysis, these items were collapsed with learning-oriented items into a single factor (learning/enjoyment climate). The questionnaire was renamed the Parent-Initiated Motivational Climate Questionnaire-2 (PIMCQ-2), but retained the success without effort and worry-conducive climate factors. White (1996) has offered support for the predictive validity of the PIMCQ-2. Specifically, she showed that perceptions of a success without effort climate emphasized by parents were significantly correlated with ego orientation, whereas perceptions of a learning/enjoyment climate were significantly associated with task orientation. However, the first and second versions of this questionnaire are similar in the nature of their items and, therefore, the suggestion for adding other dimensions of parental influence still applies to the PIMCQ-2. Furthermore, the more powerful technique of confirmatory factor analysis should be used to examine its factor structure.

Climate measures in sport: Conclusions. In summary, despite some measurement difficulties, the studies con-

ducted in the area of sport provide support for the differential impact of mastery and performance climates on motivation. Specifically, perceptions of a mastery climate are associated with adaptive cognitive and affective patterns, such as increased perceived competence, self-efficacy, task goal orientation, enjoyment and effort. In contrast, perceptions of performance climate are linked with less adaptive or maladaptive motivational patterns, such as increased worry, an ego goal orientation and a focus on ability.

Bearing in mind the impact of perceived climates on motivation, it is important that psychometrically valid instruments are developed to measure these perceptions in a comprehensive and informative way. The questionnaires reviewed so far have not been extensively validated. The reliability of the instruments over time and certain forms of validity (convergent, discriminant, incremental) have not been assessed. Furthermore, construct validity, the most important form of validity, was not demonstrated for the PMCSQ-1, the PIMCQ-1 or the PIMCQ-2. In addition, other important motivational dimensions described in TARGET (Epstein, 1989), such as task design and pace of learning, have not been included in item pools. However, based on the theoretical and psychometric analysis of the above studies, it would appear that the PMCSQ-2 is a promising tool and should be investigated further.

Climate measures in school physical education

Epstein's (1989) and Ames's (1992a) research on the differential impact of mastery and performance perceptions of classroom climate on students' motivation has prompted many researchers to examine whether these results could be generalized to school physical education settings. Consequently, several questionnaires have been developed to assess the way in which situational goal structures are perceived in school physical education classes (see Table 3). Some of these questionnaires have also been used to examine the efficacy of interventions in changing motivational climates.

Drawing on the work of Ames and Archer (1988) on classroom motivational climate, Papaioannou (1994) developed the Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ). The face validity of a pool of 80 items was evaluated by a panel of experts. These items were reduced to 45 and, after exploratory factor analyses, further reduced to 27. Papaioannou (1994) examined the construct validity using exploratory and confirmatory factor analysis. The exploratory factor analysis was based on a large sample of 700 Greek school students in physical education and produced five factors: teacher-initiated learning orientation, students' learning

orientation, students' competitive orientation, students' worries about mistakes and outcome orientation without effort. Subsequent confirmatory factor analysis of data based on more than 1000 Greek children and youth showed that the questionnaire had a hierarchical structure with two higher-order factors (performance and mastery/learning) and five lower-order factors. Specifically, teacher-initiated learning orientation and students' learning orientation loaded on the learning (mastery) second-order factor, whereas students' competitive orientation, students' worries about mistakes and outcome orientation without effort loaded on the performance second-order factor. Correlational analysis showed that high intrinsic interest and positive attitudes towards the physical education lessons were positively related to perceptions of a learning climate and unrelated to perceptions of a performance climate.

Papaioannou (1995) provided further evidence for the predictive validity of the LAPOPECQ. Specifically, based on a sample of nearly 1400 Greek high-school students, he found that, when a high learning environment was perceived, the students had high intrinsic motivation and low anxiety irrespective of their perceived competence. In contrast, when a low learning environment was perceived, the low perceived competence students were less intrinsically motivated and more anxious than those high in perceived competence.

Papaioannou (1997) showed clearly the important role of a high learning (mastery) climate. Basing his hypotheses on the structure of the Greek physical education curriculum, Papaioannou found that higher scores on various indices of motivation were reported by students who were involved in out-of-school sport activities than those who were not, and by younger students than older ones. When differences in perceptions of a learning climate among the groups were adjusted (controlled), the differences in the motivational indices became smaller or non-significant. This finding indicates that, if all students perceive a high learning motivational climate, they will show adaptive motivational patterns (e.g. preference for challenge, interest in the lessons) despite their sporting background and age.

Validation of the LAPOPECQ has shown that it is a useful tool in the assessment of students' perceptions of motivational climates in physical education classes. It has strong construct and predictive validities, while its internal consistency is acceptable, bearing in mind that the scale has relatively few items per subscale. Furthermore, its hierarchical multidimensional structure accords with previous academic research (Epstein, 1989). It should be noted that this questionnaire has been developed in the context of Greek physical education classes. Cross-cultural psychometric

Table 3 Summary of studies measuring motivational climates in school physical education

Study	Sample	Climate measure	Aims	Results	Summary/critique
Treasure (1993)	114 American children	Modified PMCSQ-1	To examine whether participating in a task- or ego-involving climate leads to differences in cognitive and affective responses	Students in the mastery group preferred more challenging tasks, were more satisfied than those in the performance group and believed that success was caused by motivation and not by external factors	The study shows that the manipulation of climate in PE is possible according to a specific set of instructions and interactions
Goudas and Biddle (1994)	254 English school students	PECCS	To investigate the psychometric properties of the PECCS and the relationship of its subscales with intrinsic motivation	<ol style="list-style-type: none"> 1. The construct validity of the PECCS was generally supported by the results of factor analyses 2. The mastery dimension scores were found to enhance significantly the prediction of intrinsic motivation beyond that accounted for by perceived competence, whereas this was not the case for performance climate scores 	<ol style="list-style-type: none"> 1. A high performance climate is not detrimental as long as it is accompanied by a high mastery climate 2. Evidence is required of sex and age differences across the class climate dimension profile groups
Papaioannou (1994)	Studies 1 and 2: 1393 and 394 Greek school students respectively	LAPOPECQ	To develop a questionnaire to measure perceptions of learning and performance orientations in PE classes	<ol style="list-style-type: none"> 1. Confirmatory factor analysis revealed two higher-order factors: one learning-oriented and one performance-oriented 2. Students' intrinsic motivation and positive attitudes towards the lesson were positively related to the learning-oriented scales and unrelated to performance-oriented scales 	The LAPOPECQ can be enriched by adding items from classroom-specific questionnaires

Papaioannou (1995)	1393 Greek school students	LAPOPECQ	To examine how perceived motivational climate in PE is related to (a) perceptions of teachers' differential treatment of high and low achievers, (b) reported motivation and anxiety of children with high and low perceived competence during play with high- or low-ability children	Perceived competence had no effect on intrinsic motivation when extremely high learning goals were adopted. When low learning goals were adopted, motivation decreased for children with low perceived ability playing with high achievers and for children with high perceived ability playing with low achievers	Need to test the LAPOPECQ with other than Greek populations
Biddle <i>et al.</i> (1995)	Studies 1, 2 and 3: 311, 179 and 146 French school students respectively. Studies 4 and 5: 254 and 85 British school students respectively	1. EPCM 2. PECCS	1. A cross-national research project investigating the measurement of perceived class climate in PE lessons 2. To examine the relationships between motivational climate and related motivational variables	1. Psychometric analysis was more satisfactory for the French rather than the English language scale 2. A shortened version of the PECCS assessing mastery and performance dimensions of climate was shown to predict important motivational measures	More work with PECCS is needed to test its psychometric characteristics
Cury <i>et al.</i> (1996)	700 French female school students	EPCM	To test a model of proposed relationships between motivational climates, dispositional goals, perceived competence and intrinsic interest	Motivational climates were found to be more important than dispositional goals in influencing pupil interest in PE. Perceived competence was also a significant predictor of intrinsic interest in PE	1. Future research should test the same model with male students 2. The relationships of the variables in the model are correlational and no causal inferences should be made
Mitchell (1996)	622 American middle school students	PELES	1. To design an instrument (PELES) to measure perceived learning environment in PE 2. To explore relationships between perceived learning environment and intrinsic motivation	1. The PELES consisted of three factors: perceived challenge, perceived threat and perceived competitiveness 2. Perceived threat and perceived challenge predicted intrinsic motivation for both males and females	Further psychometric analysis of PELES is needed, especially to confirm its factor structure

Table 3—continued

Study	Sample	Climate measure	Aims	Results	Summary/critique
Solmon (1996)	109 American school students	Modified PMCSQ-1	To examine whether students' persistence and attributions for success would differ as a function of motivational climates	<ol style="list-style-type: none"> 1. Students in the mastery climate showed higher persistence at a difficult level than those in a performance climate 2. Attributions of success to normative ability were linked more to performance than to mastery climate 	<ol style="list-style-type: none"> 1. Mastery climates can be effectively implemented in PE 2. The intervention period was relatively short and the motor task could have been more typical of a PE class motor skill
Solmon and Lee (1997)	819 American school students	PMCSQ-1	To test the relationship of the subscales of the newly developed Cognitive Processes in Physical Education Questionnaire with motivational climate	<ol style="list-style-type: none"> 1. Mastery climate was positively related to all adaptive cognitive processes in physical education 2. The inverse pattern of relationships emerged for performance climate 	Performance climate can reduce adaptive cognitive processes in physical education, significantly more so than ego orientation
Papaioannou (1997)	1393 Greek school students	LAPOPECQ	<ol style="list-style-type: none"> 1. To test differences in motivation between students of different age and sport experience 2. To examine whether these differences would remain if differences in mastery climate were controlled 	<ol style="list-style-type: none"> 1. Younger and more experienced students reported higher motivation 2. When differences in perceptions of a mastery climate were controlled, the differences in the motivational indices became smaller or non-significant 	This study shows in a very clear manner the positive role that perceptions of mastery climate can play in compulsory physical education contexts
Papaioannou (1998)	674 Greek school students	LAPOPECQ	To examine the relationships between goal orientations and motivational climate with aspects of PE lesson discipline	<ol style="list-style-type: none"> 1. Mastery climate associated with strategies operated by the teacher that focused on self-determined reasons for discipline 2. Performance climate associated with introjected, extrinsic and 'indifferent' reasons for discipline 3. Self-reported discipline of students was related to a task orientation and mastery climate 	Task orientation and mastery climate were associated with an internalized desire of pupils to be well-disciplined in PE lessons

validation is required before it can be used with other nationalities or languages.

Further improvement of the questionnaire might be achieved by including items from classroom-specific questionnaires, for example the Classroom Environment Scale (Moos and Trickett, 1987) and the Learning Environment Inventory (Fraser *et al.*, 1982). Such items could measure perceived challenge, perceived organization, design of tasks, pace of learning and involvement in decision-making in physical education classes. To this end, Goudas and Biddle (1994) attempted a broader conceptualization of the classroom climate by adding two factors that have been shown to influence student motivation in classrooms (Moos and Trickett, 1987) to four of the subscales of the LAPOPECQ (the 'outcome orientation without effort' factor was excluded). These additional factors were the students' perceptions of choice and the students' perceptions of teachers' support. The new scale was called the Physical Education Class Climate Scale (PECCS) and consisted of 26 items. The construct validity of this scale was examined through exploratory factor analysis based on a sample of 254 English school students. The results showed a six-factor solution that included the two new factors and the four factors of the LAPOPECQ. However, several items crossloaded to different factors, while other items had to be deleted to obtain acceptable internal consistency. In a further analysis, Goudas and Biddle (1994) showed that the six factors loaded on two higher-order factors: the first was called mastery climate and consisted of the subscales of perceived choice, teacher support, teacher-initiated learning and student learning; the second higher-order factor was called performance climate and consisted of the subscales class competitive orientation and worries about mistakes.

To provide support for the predictive validity of the PECCS, Goudas and Biddle (1994) examined the multivariate relationship of the mastery and performance factors with intrinsic motivation indices. They showed that children perceiving physical education classes to be high in *both* mastery and performance climates reported more enjoyment and perceived competence than children in classes with different combinations of climates. This suggests that perceptions of high performance climate may not be motivationally detrimental, as long as they are accompanied by perceptions of high mastery climate.

At first glance, this suggestion appears to be at odds with Ames's (1992a) argument that, when the classroom structures convey mixed goals, students will experience difficulties interpreting such incongruous messages. Specifically, Ames (1992a) argued that situational goal structures interact in a multiplicative rather than in an additive manner; that is, the strengths in one structure cannot compensate for the inadequacies

of other structures. It should be emphasized, however, that the mere presence of social comparison information is not motivationally detrimental. It is only when it is emphasized as a means of achievement that it becomes problematic (Jagacinski and Nicholls, 1987). In support of this argument, Ames and Archer (1988) found that the facilitating effects of a mastery learning environment on various cognitive and affective outcomes in classrooms were not diminished by the mere presence of performance-oriented cues.

To provide further evidence for the construct validity of the PECCS, Biddle *et al.* (1995) tried to confirm its hierarchical factor structure with English school students. The hierarchical model did not fit the data very well. In its present form, the scale cannot be used as a valid measure of perceived motivational climates in school physical education, as it has not been extensively validated, and the validation process conducted to date has not been particularly encouraging as far as the psychometric results are concerned. Since most of its scales were based on the LAPOPECQ, which was validated on a Greek population, a cross-cultural validation of the PECCS is needed. It is possible that cultural differences have accounted for the inadequate factorial structure of the PECCS for the English population.

Biddle *et al.* (1995) conducted a cross-national study by developing a French climate scale, as well as the English PECCS, for use in physical education classes. The French scale, the 'L'Echelle de Perception du Climat Motivational' (EPCM; 'Perception of Motivational Climate Scale'), was a French version of Goudas and Biddle's (1994) PECCS. Specifically, the PECCS was translated into French and checked using the backward translation technique. Furthermore, its construct validity was tested through exploratory factor analysis based on 311 French students. The analysis gave a clear factor solution with two higher-order factors, in accordance with the findings of Goudas and Biddle (1994). The first higher-order factor was called mastery and consisted of two lower-order factors: pursuit of progress by pupils and promotion of learning by the teacher. The second higher-order factor was called comparison (synonymous with performance climate) and comprised three lower-order factors: pursuit of comparison by pupils, worries about mistakes and promotion of comparison by the teacher.

The EPCM consisted of 19 items and showed high internal consistency and test-retest correlations over a one-week period with 146 French school students. Furthermore, to examine the construct validity of the EPCM further, Biddle *et al.* (1995) conducted a confirmatory factor analysis using a new sample of 179 French students; this is a small sample size for such an analysis. The results provided clear support for the

hierarchical factorial structure of the EPCM by showing a good fit to the data. The factorial structure of the scale was also supported in another exploratory factor analysis conducted by Cury *et al.* (1996). In the same study, the predictive validity was supported through structural equation modelling, which showed that motivational climates are more important than achievement goals in influencing interest in physical education classes for 700 French adolescent girls.

The EPCM appears to be a promising tool for measuring perceptions of motivational climates with French-speaking populations. It has strong construct validity, good predictive validity and satisfactory internal consistency, but its convergent and discriminant validities need to be established. The multi-dimensional and hierarchical structure of the EPCM is in accordance with the empirical findings of Papaioannou (1994) and Goudas and Biddle (1994) and with Epstein's (1989) theoretical work.

Another instrument designed to measure the perceived environment in school physical education, the Physical Education Learning Environment Scale (PELES), was developed by Mitchell (1996) using a sample of 300 American middle school students. The validation process of this scale has been inadequate and further testing is required before it can be regarded as a valid instrument.

Three further studies have focused on the motivational climates of school physical education by adapting questionnaires from other settings. As we have argued in the introduction to this section, valid measures of motivational climates can improve our knowledge and help in the application of effective intervention strategies. Treasure (1993) designed an intervention study targeted at 114 young American students. Mastery and performance climates were created by manipulating the TARGET structures that define performance and mastery motivational climates. Specifically, each structure was translated into mastery- or performance-oriented strategies for teaching soccer skills. After 10 intervention sessions, and after the efficacy of the manipulations was checked, the effectiveness of the intervention was assessed with the Perceived Motivational Climate in Sport Questionnaire-1. Treasure (1993) modified this instrument from sport to reflect motivational climates in school physical education. A positive characteristic of this study was that the questionnaire included items specific to the intervention (e.g. 'Stars were awarded based on personal improvement').

The results showed that participants who performed in the mastery climate reported more positive cognitive and affective responses than those who were assigned to the performance climate. Specifically, children in the mastery condition reported a preference for more

challenging tasks, focused more on effort and were more satisfied than children in the performance condition. The study was carefully designed and implemented and was very effective in translating the TARGET structures into specific strategies. Furthermore, it provides strong evidence of the benefits of implementing mastery motivational climates in school physical education, a conclusion supported by the results of a similar intervention study by Solmon (1996).

In another study, Treasure (unpublished results, Southern Illinois University) adapted the Classroom Achievement Goals Questionnaire of Ames and Archer (1988) for school physical education to assess the perceptions of motivational climates held by a sample of young American school students. The perception of a mastery motivational climate was positively related to feelings of satisfaction, the belief that effort and ability cause success in physical education, a positive attitude towards physical education and high perceived ability. In contrast, perceiving the motivational climate as performance-oriented was related to feelings of boredom and to the belief that ability is the cause of success in physical education. When these results are combined with those from academic and sport contexts, they show clearly the qualitatively different motivational patterns that mastery and performance climates convey.

Climate measures in school physical education: Conclusions.

In the studies reviewed here, perceptions of mastery climate were operationalized as the degree to which students (1) had choice over the learning process, (2) pursued individual progress, (3) felt challenged and (4) were supported in their learning efforts. Perceptions of performance climate were operationalized as the extent to which students worried about their mistakes, felt threatened and their evaluation was based on inter-individual comparison. These studies showed that perceptions of a mastery climate are important in increasing and sustaining the motivation of students in physical education settings. Specifically, perceptions of a mastery climate are related to high intrinsic interest and positive attitudes towards lessons, intentions to exercise and low anxiety. Perceptions of a performance climate are unrelated or negatively related to these cognitive and behavioural factors.

Despite the evolving nature of measurement tools, these findings suggest that it is important for interventions to be carried out in school physical education settings that will implement structures compatible with perceptions of a mastery climate. Two such interventions have been conducted (Treasure, 1993; Solmon, 1996) and their success should encourage other researchers to follow similar procedures. To assess the effectiveness of interventions, and to assess the

impact of perceived climates on motivation, it is important that psychometrically valid instruments are refined in the setting of school physical education. From the psychometric work conducted to date, it would appear that the Learning and Performance Orientations in Physical Education Classes Questionnaire (Papaioannou, 1994, 1995) and the L'Echelle de Perception du Climat Motivational (Perception of Motivational Climate Scale) (Biddle *et al.*, 1995) are promising tools for measuring motivational climates with Greek and French populations, respectively. With regard to English-speaking populations, the Physical Education Class Climate Scale (Goudas and Biddle, 1994; Biddle *et al.*, 1995) and the Physical Education Learning Environment Scale (Mitchell, 1996) require further testing.

Questionnaires designed to assess school physical education climates may benefit from adopting items from classroom-specific questionnaires. Academic research has demonstrated the multifaceted character of classroom environments; this multidimensionality has been reflected in the construction of classroom questionnaires. For example, items that measure affiliation among students, teachers' control over the learning process, or the severity of punishment for breaching rules, can be borrowed and adapted to offer a more detailed and thorough description of school physical education environments.

Quantitative synthesis of the correlates of motivational climate

In addition to the narrative review, the impact of different types of motivational climates on cognitive and affective outcomes should be examined by quantification of results across studies. The need for a quantitative synthesis is emphasized by the many studies which have not reported indices that could show the *magnitude* of effects of different climates on motivation (see Thomas *et al.*, 1991). Unfortunately, the studies that have measured motivational climates in sport and school physical education to date are limited and, therefore, a full meta-analysis is premature. However, effect sizes that can be calculated from some studies can give an indication of the differential impact of performance and mastery motivational climates on motivation. Effect sizes cannot reflect causation, only strength of relationships. Fourteen studies reviewed contained sufficient information to combine their findings and calculate effect sizes in accordance with Hunter and Schmidt's (1990) guidelines. These studies were Seifriz *et al.* (1992), Walling *et al.* (1993), Papaioannou (1994, 1995), Kavussanu and Roberts (1996), Mitchell (1996), Solmon (1996), White (1996), Solmon and Lee (1997), Goudas (1998), Liukkonen *et al.* (1998),

Ntoumanis and Biddle (1998), Ommundsen *et al.* (1998) and Williams (1998). Hunter and Schmidt (1990) argued that the accumulation of effect sizes across studies is a valid way of reviewing an area of interest even when the number of studies is small. The degree of accuracy of the results can be evaluated in the future when a meta-analysis based on more studies is conducted.

The correlations of individual studies were corrected for sampling error and measurement error, thus reducing the impact of poor measurements alluded to earlier, and were evaluated in accordance with Cohen's (1992) suggestion that, when analysing correlations, 0.10, 0.30 and 0.50 represent small, medium and large effect sizes respectively. The effect of mastery climate on positive motivational outcomes (e.g. satisfaction, positive attitudes towards the lesson, intrinsic motivation) was 0.71 and can thus be viewed as large. In contrast, the effect of performance climate on positive outcomes was small to medium and in the opposite direction (effect size = -0.30). When negative motivational outcomes were analysed, such as worry and anxiety, the impact of mastery climate was -0.26, a small to medium effect size. In addition, the impact of performance climate on negative outcomes was moderate (effect size = 0.46). (Details of the calculation of effect sizes are available on request from S.J.H.B.)

These effect sizes were calculated on a population of 4484 people and can give a reasonably good indication of the magnitude of effect associated with mastery and performance climates. They provide quantitative support for the studies we have reviewed narratively and show a positive effect for mastery climate and a negative impact of performance climate on motivation and cognition of physical activity participants. With the exception of the effect size for mastery climate with positive outcomes, the effect sizes are not as large as the literature would appear to suggest when reviewed narratively. This provides further support for the need to quantify results of studies. When more research is conducted, a meta-analytic synthesis of results will be necessary to provide more conclusive findings and to strengthen, verify or dispute the narrative assumptions of this review. A meta-analysis based on more studies will indicate the homogeneity of the correlations and whether there are moderators in operation. For example, research has shown that, in general, males have more performance-oriented perceptions of climate than females (Kavussanu and Roberts, 1996). Therefore, the negative impact of performance climate on motivation may be greater for males than females. Furthermore, in school physical education settings, the variability in physical ability may be greater than in sport, where samples are typically self-selected, and more students may feel low in competence. Perceptions

of a performance climate in school physical education contexts, therefore, may lead to more negative motivational outcomes than in volunteer sport contexts.

Some thoughts on mechanisms

The literature reviewed and the effect sizes reported suggest that mastery climates are beneficial in the creation of positive psychological responses. This is consistent with evidence on individual goals in which a mastery (task) goal has been shown to be related to numerous adaptive psychological outcomes (see Duda, 1993). The explanation for such effects is an important step in furthering our understanding, as well as being important in advancing the effectiveness of intervention strategies. In addition, such an analysis attempts to answer the important question 'why?'

Deci and Ryan, in numerous publications, have argued that the question 'why' is important for identifying the source or impetus that creates a goal, thus impacting on how the goal regulates, or affects, the pursuit of the goal (see Ryan *et al.*, 1996). Underpinning this approach is the function that the goal has or the needs it fulfils. Ryan *et al.* (1996) suggested that there are three basic human needs: autonomy, competence and social relatedness. This forms part of Deci and Ryan's (1985) Self-Determination Theory (SDT) approach to motivation and provides a background against which the positive impact of a mastery climate can be judged. Deci and Ryan argued that intrinsic motivational forces are more likely to create positive psychological outcomes than extrinsic ones. The need for autonomy suggests that humans will be satisfied more through intrinsically regulated behaviour, as such actions are autonomous and performed out of personal interest in the task itself. On the other hand, extrinsically regulated actions are more likely to be viewed as 'controlling'; pressure comes from outside the person and the perceived locus of causality will be more external.

A mastery climate affords choice, self-determined criteria for success and, hence, autonomy. Performance climates, however, are more controlling. The teacher or coach is likely to be seen as operating more extrinsic criteria for success (e.g. normative ability assessments), so this climate will be linked with less positive psychological outcomes. This is consistent with research on attributions and emotional outcomes in physical activity (Biddle, 1993). Positive psychological outcomes have been shown to be associated with attributions that infer personal control.

In addition to the connection between climate and feelings of autonomy, a mastery climate is also likely to be associated with higher perceptions of competence (another of Deci and Ryan's basic human needs), as it

offers a less differentiated conception of ability. In a mastery climate, effort and ability are less clearly differentiated as causes of achievement. On the other hand, a performance climate enhances the differentiation between ability and effort, because normative ability is rewarded, and success with low effort could be seen as indicative of even greater ability (Nicholls, 1989).

Future directions for research on motivational climate

Cultural and political factors can affect the formation of psychological environments where physical activity takes place, an influence that should be taken into account when perceptions of motivational climates are measured (Coakley, 1994). In proposing future directions for research, we suggest the integration of psychological, social and cultural factors for a better understanding of the achievement climate in physical activity. Other directions for future research include methodological, conceptual and practical issues.

A broader perspective on the examination of motivational climates in sport

The research that has been conducted on motivational climates in physical activity contexts has focused on the influence of teachers, coaches, parents and peers on the motivational patterns of participants. It can be argued that this is a rather narrow perspective, because it ignores the influence of cultural and social factors on the formation of physical activity climates. It is possible that motivational climates are conceptually distinct in different cultures because of the different meanings that individuals attach to the social environment. As Maehr and Braskamp (1986) have argued, the wider socio-cultural context can significantly affect the construction of meaning and the personal investments that individuals will exhibit. They suggested that there are cross-cultural similarities and differences in the meaning of achievement, success and failure, which probably affect the construction and perception of motivational climates.

The need for cross-cultural validation of goal orientation theory in physical activity has been identified by Duda and Allison (1990). To date, there is a lack of research into how cultural factors shape the social context of physical activity. Most research has been restricted in its focus, examining the motivational patterns of mainly North American and Western European participants. However, cultural factors, together with political factors, interact to produce distinct values and frameworks that influence the behaviour and cognition of exercisers, athletes, coaches and spectators. For

example, Hayashi (1996), using qualitative methods, found cross-cultural similarities and differences among Anglo-American and Hawaiian weight-training participants in terms of the nature of goal orientations and the social context of the physical activity setting. Although both ethnic groups perceived individualistic, competitive and cooperative goals and climates to be in operation, the Hawaiian participants additionally identified the expression of in-group pride as an important goal and environmental factor. This line of research is, therefore, important in identifying common and distinct goals and social influences across cultures, thereby providing a more comprehensive understanding of achievement motivation.

Political factors can also play an important part in the creation of motivational climates. When examining elite sport in particular, the interplay between sport and politics becomes apparent (Coakley, 1994). World and Olympic Games have become an international arena where countries want to demonstrate their political, cultural or economic superiority. Therefore, there is great pressure on athletes to win and bring fame to themselves and their countries. This will probably lead to a greater emphasis on performance-oriented motivational climates that glorify the demonstration of superior ability over opponents. In a broad sense, the mass media also contribute to the shaping of the psychological climate in sport. The mass media have often been accused of emphasizing competition, winning, aggression and inventing rivalries even where they do not exist (Coakley, 1994), thus implicitly promoting performance-oriented climates. For example, Young and Smith (1988) have provided evidence that media presentations of sports violence, particularly at the professional level, contribute to a social climate in amateur sports that is conducive to violent behaviour.

The emphasis on winning and on performance climates is not restricted to elite sport. Lackey (1986) showed that not only professional and collegiate coaches, but high school coaches as well, reported moderate to high pressure on them to win from parents, fans and administrators. Lackey also stressed that winning and losing are seen as more important by the public today than they were two decades ago. It is important, therefore, to realize that viewing coaches and parents as the only determinants of social climate in sport provides a rather restrictive focus. Moreover, it is important to understand that future interventions in motivational climates should take account of the social environment in which individuals participate. Since socio-cultural differences have been found in the construction of meaning and the notion of achievement (Maehr and Braskamp, 1986), it is probable that a unifying set of instructions will not be equally applicable in different contexts. Therefore, intervention strat-

egies should account for findings from cross-cultural studies to maximize their effectiveness. To this end, the blending of psychological and sociological research may prove productive and enlightening.

Children are influenced by several social agents, which provide a wide range of values and norms. In a comprehensive model, McPherson and Brown (1988) demonstrated how different factors (coaches, parents, peers, officials, school teachers and the mass media) interact to affect the expectations, emotions and behaviour of children in sport. It is important to consider when conflicting sets of values arise for participants. For example, coaches and parents may try to promote a task orientation for their young athletes, while powerful role models or the mass media glorify a winning or ego perspective. We suggest a greater emphasis on multi-disciplinary socio-cultural research into achievement climates in exercise and sport psychology.

Motivational climates in school physical education and exercise settings

Future research should examine how the social agents just discussed are influential in the creation of motivational climates in school physical education. For example, do parents exert less of an influence on the shaping of the psychological climate in school physical education than in sport? Furthermore, future studies could adopt ideas used in classroom environment studies and explore differences between students and teachers in their perceptions of actual and preferred motivational environments, examine whether students perform better in their preferred classroom environment, compare different classroom environments and monitor stability or change over time.

A suggestion that is applicable to both school physical education and sport contexts is that there should be more research on how peer interactions influence the creation of motivational climates. As Brustad (1992) has argued, children often imitate and adopt the behaviour and performance standards of salient socialization agents. As developmental research has shown, the socialization influence of peers becomes more important after early adolescence. Weiss and Duncan (1992) have shown that peer acceptance is related to high perceived and actual competence. It is necessary, therefore, to understand how perceived competence is construed in peer relations, particularly given the importance of perceived competence in achievement motivation research (Roberts, 1992). It would appear that, from early adolescence, peer comparison and evaluation become progressively more important in judging one's physical competence (Horn and Weiss, 1991). If peer acceptance is based on the demonstration of superior ability, it is probable that peer influence will contribute

to a performance-oriented climate. Coaches, teachers and researchers should be aware of this when trying to implement a mastery environment, and peer influence should be reflected in items of climate questionnaires.

Few studies have examined directly the impact of different motivational climates on cognition and motivation of exercise participants. Given the importance of this for public health, it may be a fruitful line of enquiry in the future. When using or developing scales for this area of research, elements unique to the exercise context should be included, such as items relating to the perception of social norms associated with fitness or body appearance. For example, it would be relevant to know whether instructors in exercise classes stress individual improvement in fitness or whether they promote interpersonal comparison.

Methodological and conceptual issues

Research has been inconsistent on whether there is a strong relationship between the two dimensions of motivational climate. Biddle *et al.* (1995) and Papaioannou (1994) found mastery and performance climates to be unrelated, whereas Walling *et al.* (1993) and Kavussanu and Roberts (1996) found them to be significantly and negatively related. When such significant correlations were reported, their magnitude was relatively small. The orthogonality of the two climates has also been supported in the classroom by the work of Ames and Archer (1988). If the two climate dimensions are independent, then 'climate profiles' should be used in research to examine how performance and mastery climates interrelate within the same person (Goudas and Biddle, 1994). Similar research has been followed recently in the goal orientations literature (see Fox *et al.*, 1994). Climate profiles would allow for tests of the combined effects of mastery and performance climates, such as might occur in, say, a sports training context, where personal striving and interpersonal comparison may both be used for motivational purposes. Whether the climate changes from one type to another in a short time, or whether the two operate simultaneously, is unknown, although some suggest that it is not possible for both to operate together (Ames, 1992). The statistical and conceptual relationship between the two climate domains requires further consideration.

Recently, it has been suggested in sport psychology that, in addition to achievement goal orientations, we should also measure goal involvement, which represents specific goal states dominant in a particular situation (Goudas *et al.*, 1995; Harwood and Swain, 1998). In the same way, it might be useful to assess not only the motivational climate that *usually* exists in a team, but also the climate that is dominant at a particular time. It is possible that, at different times during the

competitive season, different combinations of climate may be more dominant than others. This argument is supported by Ames and Archer's (1988) suggestion that informational cues in the psychological climates are often mixed and tend to be inconsistent over time. It would be interesting to examine, through longitudinal research, if such changes in motivational climates occur, what their motivational consequences are and whether they can produce different states of goal involvement. Regrettably, longitudinal studies in this field are few.

Conclusions

The purpose of this review has been to provide an overview of the findings of past and contemporary research on the influence of different situational structures and psychological environments on the motivation and cognition of sport, school physical education and exercise participants. The results, in general, show that, when task-oriented instructions are given or when mastery motivational climates are perceived as salient, individuals are more likely to exhibit adaptive cognitive, affective and behavioural patterns. In contrast, these patterns are more likely to be maladaptive when ego-involving instructions are given and individuals perceive their climates to be performance-oriented. These results are also supported by accumulating effect sizes over 14 studies.

We have argued that physical activity environments can influence individuals' views about the nature and purposes of learning and, subsequently, their investment in physical activity settings. Therefore, it is important that perceptions of different motivational climates should be evaluated with psychometrically sound instruments. This can also help the effective organization of intervention strategies. Although none of the reviewed questionnaires has been extensively validated, from the psychometric work conducted to date it would appear that the Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2), the L'Echelle de Perception du Climat Motivational (EPCM; Perception of Motivational Climate Scale) and the Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ) are promising tools for measuring motivational climates with English, Greek and French-speaking populations respectively. Furthermore, we have argued that questionnaires designed to assess physical activity climates could benefit from adopting items from classroom-specific questionnaires.

We have stressed the need to examine the role of perceived motivational climates in exercise-related motivation and to examine how peer interactions influence the creation of different perceptions of

motivational climates. We argue for the usefulness of examining climate 'profiles', the need to report the magnitude of the effects of different achievement climates on motivation indices, and the need to assess personal and situational variables that can moderate these effects, such as sex and type of physical activity. Finally, a broader perspective on the examination of motivational climates in physical activity was offered, which proposed the examination of the joint influence of factors such as culture, politics, the mass media, coaches, parents and peers.

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