Positive Classroom Motivational Environments: Convergence Between Mastery Goal Structure and Classroom Social Climate

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In a series of 4 studies we investigated the relations of mastery goal structure and 4 dimensions of the classroom social climate (teacher academic support, teacher emotional support, classroom mutual respect, task-related interaction). We conducted multidimensional scaling with separate adolescent samples that differed considerably (i.e., by racial and demographic characteristics, grade level, and educational contexts). Studies 1, 2, and 3 (Ns = 537, 537, and 736, respectively) showed that mastery goal structure items occupied a central space among the climate items and overlapped partially with the areas formed by the respect and academic and emotional support items. In Study 4 (N = 789) we investigated the structural relations of mastery goal structure and the 4 social climate scales with another adolescent sample. Using confirmatory factor analysis we compared these 2 models: (a) all 5 measures at the same level and (b) mastery goal structure as a 2nd-order factor, with the 4 social climate measures as its indicators. The fit for both models was good, although the 1st-order model fit was better. Nevertheless, in the 2nd-order model mastery goal structure accounted for between 92% and 67% of the variance in the climate measures.

Keywords: motivation, goal theory, mastery goal structure, classroom climate, classroom environment

Classroom environments play an important role in students’ motivation, engagement, and achievement at school. Over the years, researchers have suggested various ways to conceptualize the characteristics of classroom environments that would be related to students’ adaptive engagement. Two influential frameworks have been achievement goal structures—students’ perceptions of the motivational emphases in their classroom (Ames, 1992b; Kaplan & Maehr, 2007; Meece, Anderman, & Anderman, 2006) and the classroom social climate (see e.g., Fraser, 2000; Haertel, Walberg, & Haertel, 1981). These two frameworks have made important contributions to understanding the nature of positive classroom environments; however, each has limitations. The goal structures perspective is strong theoretically but not in terms of relating students’ perceptions of the environment to actual teacher practices and classroom life, particularly social interactions and relationships (see e.g., L. H. Anderman, Patrick, Hruda, & Linnenbrink, 2002; Blumenfeld, 1992). In turn, the classroom social climate perspective is strong in depicting actual classrooms and students’ perceptions but is not well developed in its theoretical explanation of the underlying processes linking classroom environments and student outcomes (Ames, 1987).

In the current study we suggest that classroom goal structure and social climate research are complementary and can inform each other’s weaknesses. More specifically, we propose that the classroom achievement goal structure is manifested primarily in the quality of social relationships with the teacher and among students and therefore that it is highly intertwined with, if not inseparable from, the classroom’s social climate. A theoretical integration of the two perspectives can enhance understanding of the nature of positive classroom environments, advance research in this area, and also contribute to educational practice. We elaborate in this article on the support for integrating the two perspectives. We begin by reviewing achievement goal theory and specifically the construct of classroom goal structures. We then review the social climate literature on the role of students’ perceptions of social relationships within the classroom. We continue by proposing a theoretical integration of goal structures with social processes within the classroom climate, focusing on mastery goal structure. We then test our proposal by conducting a series of four studies to investigate the hypothesized relations among the constructs.

Achievement Goal Theory

Achievement goal theory explains students’ motivation by focusing on their purposes for engaging in achievement behavior and...
their beliefs about the nature of competence. Researchers have focused predominantly on two purposes—to develop competence (i.e., a mastery goal orientation) and to demonstrate competence (i.e., a performance goal orientation). Goal theory assumes that students’ motivation is influenced not only by their individual personal dispositions and beliefs but also by the environment (Ames, 1992b; Maehr, 1984; Nicholls, 1989). Thus, classroom environments are considered with respect to students’ perceptions of the purposes for engaging in academic tasks and what constitutes success—the classroom goal structures (Ames, 1992b). Teachers’ practices and classroom norms, rules, and routines contribute to students’ perceptions of goal structures. As with personal goal orientations, researchers have examined goal structures that emphasize mastery goals (i.e., the development of competence) and performance goals (i.e., the demonstration of competence). These goal structures are unrelated or only weakly related to each other (Kaplan, Middleton, Urdan, & Midgley, 2002; Wolters, 2004). That is, students may perceive an emphasis on both, to varying degrees, in the same classroom.

A mastery goal structure involves a perception that students’ real learning and understanding, rather than just memorization, are valued and that success is accompanied by effort and indicated by personal improvement or by achieving absolute standards. According to predominant views, this emphasis is communicated by a set of practices represented by the acronym TARGET (see e.g., Ames, 1992a; Kaplan & Maehr, 1999, 2002, 2007; Maehr & Anderman, 1993; Meece et al., 2006; Midgley, 1993). Specifically, tasks are meaningful, challenging, and interesting, with a range of options available so that ability differences are not accentuated. The teacher shares authority and responsibility for rules and decisions with the students. Recognition is available to all students and involves progress or effort, with few opportunities for social comparison among students. Grouping is flexible and heterogeneous, and students are not grouped by ability. Evaluation is criterion-referenced, not made public, and grades and test scores are interpreted in terms of improvement and effort. And time use is flexible, with opportunities for students to pace themselves.

A performance goal structure involves a perception that learning is predominantly a means of achieving recognition of worth and extrinsic rewards and that success is indicated by outperforming others or surpassing normative standards. This emphasis is believed to be communicated by uniform assignment of tasks, homogeneous and fixed grouping, evaluation that is public and interpreted in terms of students’ relative performance, and rigid time structures, all of which make ability differences salient (Ames, 1992b; Kaplan & Maehr, 1999; Meece et al., 2006).

Goal structures involve “a cognitive mediation model of motivation [whereby] . . . students’ thoughts, perceptions, and interpretations mediate the effects of teacher behavior” (Ames, 1992b, p. 268). Therefore, because students’ individual experiences and interpretations contribute to their current perceptions, students in the same class do not necessarily perceive teacher practices in the same way (Ames, 1992b; Ames & Archer, 1988; Urdan, Kneisel, & Mason, 1999). Adding to variability in perceptions, students in the same class are often treated differently and therefore do not experience the same educational context (Ames, 1992b; Turner & Patrick, 2004). Empirical findings correspond with this premise and indicate that students in the same class report only small-to-moderate levels of shared perceptions of goal structures. For example, the variation between classes in perceived mastery goal structure ranges from 9% to 29%, with the remaining 91%–71% occurring within classes (Deemer, 2004; Kaplan, Gheen, & Midgley, 2002; Miller & Murdock, 2007; Ryan, Gheen, & Midgley, 1998; Stornes, Bru, & Idsoe, 2008; Turner et al., 2002; Urdan, 2004; Wolters, 2004). Hence, there is no one “objective” classroom goal structure (Ames, 1992b).

Assessing goal structures has primarily employed methods that focus on individual students’ perceptions of the classroom—typically self-report scales from the Patterns of Adaptive Learning Survey (PALS; Midgley et al., 1996, 2000). Items in the mastery goal structure scale address the teacher’s emphasis on student learning; however, three of the five items ask students to evaluate their teacher’s intentions (e.g., the extent to which their teacher wants them to learn and understand or to enjoy learning new things) rather than report on teacher-specific practices. Items in the performance goal structure scale involve the teacher’s public emphasis on students’ relative placement within a hierarchy of ability. Items refer to the extent to which teachers tell students how they compare academically with other students and make public who gets the highest scores on tests.

Researchers have found strong and consistent support for the theoretical predictions that classroom mastery goal structure would be associated with a wide range of adaptive motivational, cognitive, and affective beliefs and behaviors. These include positive relations between mastery goal structure and personal mastery goal orientation, self-efficacy, effort, use of effective learning strategies, not cheating, adaptive coping responses after failure, positive school-related affect, satisfaction with learning, and achievement (Ames & Archer, 1988; L. H. Anderman, 1999; Kaplan & Midgley, 1999; Murdock, Hale, & Weber, 2001; Nolen, 2003; Urdan & Midgley, 2003; Wolters, 2004; for reviews see Kaplan & Maehr, 2007; E. M. Anderman & Wolters, 2006). In comparison, classroom performance goal structure is associated with maladaptive behaviors—such as self-handicapping, cheating, procrastinating, disruptiveness, not asking for help when it is needed—and with negative affect about school (E. M. Anderman, Griesinger, & Westerfield, 1998; L. H. Anderman, 1999; Kaplan, Gheen, & Midgley, 2002; Murdock, Miller, & Kohlhardt, 2004; Ryan et al., 1998; Urdan, Midgley, & Anderman, 1998; Wolters, 2004).

In general, a mastery goal structure is associated with students’ beliefs and behaviors more strongly than is a performance goal structure (Urdan & Midgley, 2003). This may be due to the effects of performance goals being moderated by factors such as students’ perceived competence (Midloden, Kaplan, & Midgley, 2004). That is, whereas encouraging self-improvement may be positive for all students, encouraging comparisons among one another may be positive for higher achieving students but negative for lower achievers. Furthermore, maladaptive motivation and low achievement are typically associated more with a low mastery goal emphasis in the classroom than with the presence of a performance goal structure (Urdan & Midgley, 2003). Therefore, recommendations for creating positive and motivating learning environments focus on establishing a mastery goal structure.

Creating a mastery goal structure in classrooms requires knowledge of practices that promote it. However, although goal structures have clear theoretical conceptualizations within achievement goal theory, and although the practices recommended to promote mastery and downplay performance goal structures are theoreti-
cally and experimentally derived (Ames, 1990, 1992a), much less is known about how they manifest and are created in classrooms (L. H. Anderman et al., 2002; Blumenfeld, 1992). For example, what teacher practices precede or accompany students’ perceptions of a mastery goal structure?

Researchers have investigated actual teacher practices that are related to goal structures, mostly by comparing classrooms with different configurations of average goal structures. Specifically, teacher talk and observed practices were compared among classrooms perceived as being similar and those perceived as being different in goal structures (Patrick, Anderman, Ryan, Edelin, & Midgley, 2001; Patrick, Turner, Meyer, & Midgley, 2003; Turner et al., 2002). This approach allowed identification of both TARGET and non-TARGET practices that differentiate high and low goal structures and also TARGET practices that do not vary by level of goal structure. Thus, it addressed the ecological validity of goal theorists’ recommendations. The results indicated considerable congruence with the TARGET practices. However, these studies also found striking differences between high and low mastery-focused classes in social and affective aspects, particularly in terms of teacher–student relationships and messages that teachers sent about how students should relate to each other.

Dimensions such as teacher support (for both students’ learning and them as people), respect, and positive affect were salient in classrooms with a high, but not low, mastery goal structure. Additionally, teachers in high mastery goal structure classrooms tended to encourage students to help each other with schoolwork and explain their reasoning, whereas the emphasis was on listening to the teacher and individual work in low mastery-focused classrooms.

These studies resulted in important findings; however, they did not address the question concerning teachers’ actions that students attend to when perceiving their classroom’s goal structures. One study that addressed this question asked students about the thinking behind their appraisals of the classroom mastery goal structure (Patrick & Ryan, 2009). Specifically, after rating each item in the PALS scale students explained why they gave the rating they did, reporting what the teacher said or did that led to the score. Results indicated that when students judged mastery goal structure, they attended most often to the nature of teachers’ interactions with students. This included affective aspects, such as the teacher’s friendliness, kindness, approachability, use of humor to diffuse stress, and ability to show caring about students’ understanding of content and themselves as individuals. Students also mentioned pedagogical aspects of the interactions, such as teachers’ support of students’ participation and use of a variety of examples and approaches to explain content and methods that help students pay attention and learn. These findings are consistent with results from studies in which students responded to open-ended questions about their school engagement. Answers consistently involved social reasons for engaging in schoolwork, such as behaving appropriately so that the teacher will let them stay sitting with friends or working hard to maintain high achievement in a disliked subject so they can stay in the advanced class that their friends are in (Dowson & McInerney, 2001; Lemos, 1996). They also cited aspects of relationships with their teachers such as the teacher conveying respect for students and showing caring as important factors affecting their engagement (see e.g., Davidson, 1999; Phelan, Davidson, & Yu, 1998).

Although observations and open-ended questions point to teacher–student interactions as being central to students’ perceptions of mastery goal structure, achievement goal theorists have paid only scant attention in general to this area. In the present series of studies we seek to enrich achievement goal theory by integrating a domain that has paid extensive attention to this domain: classroom climate research.

### Classroom Climate Research

Fraser, Aldridge, and Adolphe (2010) noted that research on classroom climate (Johnson & Johnson, 1983)—also called social climate (Allodi, 2010), learning environments (Fraser et al., 2010), or classroom social-psychological environments (Fraser, 1998, 2000; Haertel et al., 1981)—grew from Lewin’s (e.g., Lewin, Lippitt, & White, 1939) recognition that classrooms have distinct psychological environments. Most research in this area has relied on factor analytic techniques to identify various classroom dimensions that are perceived by students as being distinct. Dimensions have included aspects of interpersonal relationships, student–teacher relationships, peer relationships, teachers’ beliefs and behaviors, teachers’ communication style, classroom management and group processes” (Allodi, 2010, pp. 89–90). Whereas the extensive research in this area provides empirical support for the significance of these dimensions, the classroom climate literature is primarily data-driven, and except for acknowledgment of general sociocognitive premises that highlight the role of students’ perceptions as mediating between teacher behavior and student outcomes (Fraser, 2000), researchers have paid limited attention to the specific theoretical processes that undergird the dimensions (Ames, 1987).

Consistent with their pragmatic and analytic approach to assessing context-specific environmental dimensions, classroom climate researchers have created a variety of psychometrically strong instruments that cater to different types of learning environments (e.g., classes with constructivist or collaborative instruction, science laboratory classes; see Fraser, 1998, 2000, for reviews). These instruments include the Learning Environment Inventory (Walberg & Anderson, 1968), Classroom Environment Scale (CES; Trickett & Moos, 1973), My Class Inventory (Fisher & Fraser, 1981), Classroom Life Instrument (CLI; Johnson & Johnson, 1983), Individualized Classroom Environment Questionnaire (ICEQ; Fraser, 1982), Constructivist Learning Environment Survey (Taylor, Fraser, & Fisher, 1997), Inventory of Classroom Environments (ICE; Sinclair & Fraser, 2002), Questionnaire on Teacher Interaction (Wubbels & Brekelmans, 2005), and What Is Happening in This Class? (WICHIC; Fraser et al., 2010).

Classroom climate instruments have been used in a number of ways. First, they were used to describe naturalistic classrooms quantitatively at various grade levels or in different subjects (see e.g., Taylor et al., 1997; Trickett & Moos, 1973). Second, they were used to compare students’ perceptions of their current and ideal classrooms (see e.g., Sinclair & Fraser, 2002). Third, they were used to compare classrooms that differ in some way (e.g., efficient vs. inefficient; Waxman, Anderson, Huang, & Weinstein, 1997), to evaluate effectiveness of different types of interventions (see e.g., Johnson & Johnson, 1983; Nix, Fraser, & Ledbetter, 2005; Welch & Walberg, 1972), and to compare perceived classroom climate by gender (Sinclair & Fraser, 2002) and across
nations (e.g., Dorman, 2003). Finally, these measures have been used to investigate associations between classroom dimensions and students’ outcomes, including motivation (e.g., interest, importance, enjoyment, liking, career interest, positive attitudes), engagement (e.g., participation), and achievement (e.g., standardized achievement tests; Fraser et al., 2010; Goh, Young, & Fraser, 1995; Haertel et al., 1981; Henderson, Fisher, & Fraser, 2000; Johnson, & Johnson, 1983).

Research on students’ perceptions of the classroom climate has identified consistent and statistically significant associations of certain social dimensions with numerous adaptive student beliefs and behaviors (Fraser, 1998, 2000). However, the predominantly statistical approach has led to several concerns. First, there has been a proliferation of classroom dimensions identified as being meaningful to students’ outcomes and, correspondingly, a proliferation of instruments that measure classroom environments. Classroom dimensions are not consistent across instruments, and scales that assess the same or similar constructs have different names in various instruments. Without specific theoretical framing to explain links among classroom dimensions and student outcomes it is difficult to integrate findings and develop a cohesive body of knowledge. Currently, for example, the literature is ambiguous as to which dimensions are most critical for particular student outcomes, what processes mediate the relations of different aspects of classroom climate and adaptive and maladaptive students’ beliefs and behaviors, and how different social environment dimensions combine into a set of cohesive and integrated teacher practices (Ames, 1987; Pintrich & Schunk, 2002).

In summary, classroom climate research has identified specific areas of teachers’ social practices that are related to students’ motivation and engagement. However, the literature lacks a comprehensive theoretical framework that explains links between these classroom dimensions and student outcomes. We argue that achievement goal theory, and particularly the construct of mastery goal structure, may provide such a framework.

### Congruence Between Mastery Goal Structure and Classroom Climate Dimensions

Achievement goal theory and classroom climate researchers have separately identified aspects of classroom environments that promote students’ motivation, engagement, and achievement. In recent goal theory research, researchers have noted considerable shared variance between mastery goal structure and dimensions of the classroom social environment, particularly teacher support (Patrick et al., 2001; Patrick et al., 2003; Turner et al., 2002), respect (Miller & Murdock, 2007; Murdock et al., 2001; Patrick et al., 2001, 2003), and promoting interaction among students (Patrick et al., 2001). These results were found across studies using a variety of methods, including hierarchical linear modeling (Miller & Murdock, 2007; Stornes et al., 2008), classroom observation (Patrick et al., 2001, 2003), and discourse analysis (Turner et al., 2002).

In addressing how achievement goal theory may account for the associations between mastery goal structure and social climate dimensions, Patrick (2004) has speculated that students’ beliefs about and appraisals of their relationship with their teacher, and the implications of the teacher’s actions for the student personally and interpersonally, may frame students’ perceptions of the personal meanings inherent in school and schoolwork. That is, when students evaluate the extent to which their teacher promotes real understanding and personal improvement (i.e., emphasizes mastery goal structure), they draw from their perceptions of the teacher’s messages about interpersonal relationships (e.g., support, respect, helping one another). More specifically, the proposal was that students’ beliefs about whether their teacher is invested in them, committed to supporting their learning, and confident they will learn are central to perceiving a mastery goal structure in the classroom. Thus, social climate or relational dimensions may be interpreted by students as indicating a mastery goal structure.

The social dimensions of teacher support, promotion of mutual respect, and promotion of students’ interaction have been also identified as important correlates of students’ motivation, engagement, and achievement in classroom climate research. Of these three classroom dimensions, climate instruments have most consistently included teacher support. Most measures of teacher support (also called helping/friendly attitudes; Goh & Fraser, 2000; or personalization: Fraser & Fisher, 1982) refer to caring in general, with items such as “This teacher cares about us” (Goh & Fraser, 2000). Others, such as the WHIC (MacLeod & Fraser, 2010), include items that address both personal support (e.g., “The teacher is someone I can depend on”) and support for students’ learning (“The teacher helps me when I have trouble with the work”). In contrast, the CLI has different scales for personal (e.g., “My teacher really cares about me”) and academic (e.g., “My teacher cares about how much I learn”) support (Johnson & Johnson, 1983). Nevertheless, regardless of the specifics, the results of classroom climate research are consistent: Teacher support is related positively to student interest or enjoyment (Fraser et al., 2010; Fraser & Fisher, 1982; Goh & Fraser, 2000; Henderson et al., 2000; Johnson & Johnson, 1983; MacLeod & Fraser, 2010; Trickett & Moos, 1974), behavioral engagement (Johnson & Johnson, 1983), and achievement (Fraser & Fisher, 1982; Goh & Fraser, 2000; Trickett & Moos, 1974).

Perceived mutual respect, measured by classroom climate scales with different names that tap the same or similar construct, relates positively to student motivation, engagement, and achievement. Specifically, student motivation (e.g., interest) and achievement are related to measures of isomorphism (i.e., “the perceived equality of class members,” Walberg & Anderson, 1968, p. 417) and democracy (Haertel et al., 1981). Furthermore, student engagement is related to perceived democracy (Haertel et al., 1981) and teacher fairness (Johnson & Johnson, 1983).

Finally, students’ task-related interaction or involvement is also related positively to their interest in and enjoyment of academics (Fraser et al., 2010; Fraser & Fisher, 1982; Tricket & Moos, 1974) and to their achievement (Fraser & Fisher, 1982). These associations have been found with the Involvement subscales of the WIHIC (e.g., “I explain my ideas to other students”; Allen & Fraser, 2007; Fraser et al., 2010) and the CES (e.g., “Students put a lot of energy into what they do here”; Trickett & Moos, 1974) and with the ICEQ’s similar Participation subscale (e.g., “Students are encouraged to participate rather than be passive listeners”; Fraser & Fisher, 1982).

To summarize, aspects of the classroom environment identified as concurrently present in mastery goal-structured classrooms—teacher support, mutual respect, and student interaction—have also been identified as important classroom dimensions in the
climate literature. Furthermore, both mastery goal structure and these climate dimensions are associated similarly with student motivation, engagement, and achievement. These parallel findings provide a theoretical and empirical foundation for Patrick’s (2004) hypothesis of convergence between students’ perceptions of their classroom mastery goal structure and perceptions of the classroom climate constructs. We sought to examine that proposal empirically in the present studies. Integrating the goal theory and classroom climate areas of research has the potential to lead to new developments in understanding the nature of mastery-focused classrooms and the specific types of teacher practices perceived by students as emphasizing a mastery focus. Doing so may also extend the predominantly pragmatic focus of classroom climate research and aid understanding of why particular aspects of the classroom climate are associated with student motivation and achievement.

Overview of Research Questions and Studies

Our objective was to examine the extent to which young adolescents perceive classroom mastery goal structure similarly to how they perceive dimensions of the classroom social climate. Specifically, we investigated the following two hypotheses: (a) there is phenomenological correspondence between students’ perceptions of the four climate dimensions (teacher academic support, teacher emotional support, classroom mutual respect, and task-related interaction) and mastery goal structure and (b) mastery goal structure is an overarching construct that subsumes these climate dimensions.

We conducted a series of four studies to address our questions. In the first three studies we used nonmetric multidimensional scaling (MDS) with data from different grade levels and demographic samples to investigate our first question. In the fourth study we employed confirmatory factor analysis (CFA) with yet another sample to compare two models of the classroom constructs, thus investigating our second research question. The first model showed the mastery goal structure and four climate scales comprising distinct yet related constructs, and the second portrayed mastery goal structure as a second-order factor that is indicated by the four climate constructs. Together, this series of studies used the same measures but different samples, contexts, and analytic methods and therefore allowed a thorough investigation of our research questions about the relations between mastery goal structure and the classroom social climate.

Study 1

Our first study addressed the hypothesized phenomenological similarity of conceptually distinct constructs (i.e., mastery goal structure, teacher academic support, teacher emotional support, classroom mutual respect, and task-related interaction). The commonly used factor analytic methods that rely on variables being phenomenologically distinct were not appropriate for testing this hypothesis, so we employed nonmetric MDS.

MDS is a set of techniques that use the proximities among objects to produce a visual, spatial representation of the matrix of proximities among all objects in the analysis (Kruskal & Wish, 1978; Stalans, 1995). In the current research, each survey item assessing the social climate and mastery goal structure latent variables is an object, and the relation between each pair of objects (squared Euclidean distance in the current analyses) provides the measure of proximity. The spatial representation, which resembles a map, presents each item as a point in a geometric space. The distance between any two items on the map represents the strength of the relation between them, so that the stronger the relation, the closer these items will be to each other on the map. Such a visual representation of the matrix of relations between the items “reflects the ‘hidden structure’ in the data” (Kruskal & Wish, 1978, p. 7), thus allowing interpretation of a large number of relations. Such a representation has the potential to highlight features of the data that are masked when viewed by numbers alone.

Unlike exploratory factor analysis (EFA), which must satisfy assumptions about the metric, linearity, and distribution of the data and employs the relations among variables to form distinct groups, nonmetric MDS employs the relative proximity between each pair of items to form the pictorial representation of the interrelations among all the items in the analysis. When items in the map belong to scales that assess latent variables, the spatial regions on the map that are captured by connecting items belonging to the particular latent variables portray the “structural properties of variables” (Guttman & Greenbaum, 1998, p. 25). Moreover, these regions are assumed to represent the psychological space of the variable as indicated by the participants’ responses (Shye, Elizur, & Hoffman, 1994). Spatial regions of constructs that are close indicate stronger phenomenological relations between the constructs relative to spatial regions that are farther away. Moreover, the analysis allows constructs’ spatial regions to partially or fully overlap on the map, indicating an overlap in responses to the sets of items belonging to the different scales and potentially an overlap in their psychological meaning. Thus, the visual spatial representation can expose and allow examination of underlying dimensions and structural relations that organize the participants’ responses to items in the different scales in a way that EFA cannot. It provides an opportunity to examine the meaning of particular items and groups of items in light of theoretical assumptions concerning the meaning of specific items and the relations among the constructs. (For more extensive discussion on interpreting nonmetric MDS, see Guttman and Greenbaum, 1998, and Shye, 1997.)

In the current study we employed a nonmetric method of MDS, which is well suited to the analysis of the ordinal data provided by Likert-type response scales (Goldstein & Hersen, 1984). Hence, in the current analyses the proximity of each pair of items in the geometrical space represents the rank order, or relative strength, of the relation between these items, accounting for all other relations between pairs of items included in the analysis. That is, the more similarly participants responded to two items, the closer together these items were on the MDS map. Our hypothesis was that the region captured by the mastery goal structure items would spatially overlap with the regions captured by the social climate items.

The configuration of items in the geometrical space can be arranged in one (i.e., a line), two (i.e., flat space), three (i.e., a cube), or more dimensions. In order to identify the best configuration or number of dimensions for the climate and mastery goal structure measures, we conducted analyses stipulating one, two, and three dimensions and compared the stress values provided by the MDS software for each solution. Stress values range from 0 to 1, and as a rule of thumb, values below .15 are seen as indicating a good fit (Kruskal & Wish, 1978; Stalans, 1995). We also examined the
plots visually to identify and interpret the dimensions. Kruskal and Wish (1978) noted that “interpretability often plays a central role in choosing the particular dimensionality within the range of reasonable dimensionalities suggested by goodness-of-fit” (p. 57). Thus, in the interests of parsimony and ease of interpretation we sought to identify the model with both the best fit and the fewest dimensions.

We first investigated how similar items in the Classroom Mastery Goal Structure scale and the climate scales were for a sample of fifth graders. We expected that the relations among items assessing teacher academic and emotional support, classroom mutual respect, and task-related interaction would be stronger within than between the scales. However, we were uncertain how distinct the items for the Teacher Emotional Support and Teacher Academic Support scales would be. Whereas researchers (see e.g., Johnson & Johnson, 1983) have reported that the two scales form separate factors, they are sometimes collapsed into a single scale (see e.g., Wentzel, 1997) because they tend to be highly correlated. We also expected that the region of the map captured by the Classroom Mastery Goal Structure items would be close to, and overlap with, the regions captured by the social climate items. Although our focus was on mastery and not performance goal structure, and our hypotheses do not specify relations between performance goal structure and social climate, we first also included items from the Classroom Performance Goal Structure scale. Doing so allowed us to portray a more complete picture of the relations between the social climate constructs and both of the goal structures that are of interest to goal theorists.

Method

Participants. The participants were 537 fifth-grade students (51% male) from 31 classes in six elementary schools. We invited all fifth graders in three school districts (two semirural, one suburban) in a midwestern state to participate in our study. Across the schools, 95%–98% of students were White, and 0%–12% were eligible to receive free or reduced-price lunch. Surveys at Time 1 were completed by 94% (616) of all fifth graders. However, because we were also interested in examining the same students’ responses 2 years later, we retained for the present study only those students for whom we had data at both time points (537 out of 616). An examination of the items’ psychometric characteristics indicated that all but three had distributions that fell within the acceptable range of skewness (−1.82 to 1.27) and kurtosis (−1.37 to 2.18). Three items in the Teacher Academic Support scale (Items 2, 3, and 4; see the Appendix) were more negatively skewed (−2.47, −3.57, and −2.51, respectively) and peaked (6.08, 13.86, and 6.04, respectively) This indicates a violation of the normal distribution for these three items. However, the current research employs nonmetric MDS as its main analysis, which focuses on the relative magnitude of the relations between items rather than on their absolute value or on their variance properties. Therefore, the analysis is not strict with statistical assumptions that are imperative for reliability in metric analyses such as factor analysis. Moreover, because the items are part of a well-established social climate scale with scores that have been validated in previous research, we decided that the benefit of including these items outweighed the risk of slightly less reliable relations of these items.

Means, standard deviations, and correlations among the six dimensions of the classroom environment are shown in Table 1. An expected pattern of correlations was found. Classroom Perfor-
mance Goal Structure was correlated negatively with the other measures (rs ranged from –.11 to –.33), whereas Classroom Mastery Goal Structure was correlated positively with the four climate measures. Teacher Emotional Support and Teacher Academic Support were correlated moderately strongly (r = .68).

**MDS.** We next used nonmetric MDS with squared Euclidean distance as the measure of proximity to investigate the structure underlying the six constructs and the items within these constructs. We examined the stress values and $R^2$ for the one-, two-, and three-dimensional solutions. All three analyses indicated a good fit (three dimensions: stress = .06, $R^2 = .99$; two dimensions: stress = .07, $R^2 = .99$; one dimension: stress = .09, $R^2 = .98$). Despite the statistical indication for one dimension, the visual representation suggested more than one dimension. Therefore, we present the results for the two-dimensional solution. As shown in Figure 1, the items assessing performance goal structure captured a clearly separate region from all other regions in the analysis. This representation indicates that students responded to the Classroom Performance Goal Structure items in a different way from what they did to the Classroom Mastery Goal Structure and the climate items.

As explained previously, the MDS solution is affected by the relations among all pairs of items in the analysis. Hence, the apparent regional overlap of the mastery goal structure and the social climate variables could possibly have been the result of the inclusion of the Classroom Performance Goal Structure items in the analysis. Therefore, after we demonstrated that performance goal structure captures a region quite distinct from all the other constructs, and given our main interest in exploring the relations of the Classroom Mastery Goal Structure and the climate measures, we repeated the MDS without the Classroom Performance Goal Structure items. Here, the one-dimensional model fitted less well (stress = .18, $R^2 = .92$) than did the two-dimensional model (stress = .12, $R^2 = .95$) or the three-dimensional model (stress = .08, $R^2 = .97$), with the three-dimensional solution showing the best fit. An examination of the two- and three-dimensional solutions indicated that, whereas there indeed appeared to be three dimensions within the data, the organization of items in the two- and three-dimensional space were similar in characteristics. In the interests of parsimony, balancing fit indicators and interpretability of the findings, we show the two-dimensional solution in Figure 2. The findings suggest that the items of the social climate scales create clear and relatively distinct regions, with the Teacher Emotional Support items at the top of the map, the Task-Related Interaction items on the left side, the Classroom Mutual Respect items at the bottom right, and the Teacher Academic Support items on the right of the map. The Teacher Emotional Support and Teacher Academic Support regions were close to each other. The Classroom Mastery Goal Structure items region was located in the middle of these dimensions, overlapping to some degree with the areas captured by the Teacher Emotional Support items and close to the regions captured by the Teacher Academic Support and Classroom

![Figure 1](image-url)
Mutual Respect items; the region covering the Task-Related Interaction items were farther away.\footnote{The three-dimensional solution replicated this organization in a three-dimensional space, with the interaction, emotional support, and respect items presenting in distinct regions that together created a pyramid, and the academic support and mastery goal structure items appearing in the middle of the pyramid.}

**Discussion**

Spatially plotting the relations among the items of the mastery goal structure and the social climate constructs in a multidimensional space provided support for our hypotheses. First, the findings indicated that the construct of performance goal structure was clearly perceived as being distinct from mastery goal structure, consistent with the results of other empirical studies (see e.g., Wolters, 2004). Performance goal structure was also clearly perceived to be distinct from the social climate constructs. This makes conceptual sense given that support, respect, and interaction involve communication among people, but performance goal structure, or at least the scale used to measure it, involves communication about just students’ relative academic ability and not about interpersonal relationships.

More important for the main purpose of this study, in the presence of the Classroom Performance Goal Structure items, the region captured by the Classroom Mastery Goal Structure items was almost indistinguishable from the regions captured by the Classroom Mutual Respect and the Teacher Emotional Support and Teacher Academic Support items and was close to the region captured by the Task-Related Interaction items. The analysis without the Classroom Performance Goal Structure items allowed for a more detailed observation of the structural patterns of the other constructs. First, the distinct regional separation of the social climate variables supported their phenomenological distinction among the participants. Second, and of greatest interest, the region captured by the Classroom Mastery Goal Structure items was located centrally among these social climate regions and overlapped partially with the region captured by the Teacher Emotional Support items. The empirically found regional overlap suggests a phenomenological overlap of the different constructs depicted: Perceived classroom mastery goal structure corresponds strongly with perceptions of the teacher as promoting classroom mutual respect and providing emotional and academic support and is related closely to perceiving the teacher as promoting student learning-related discussion.

Because analyses that seek to uncover patterns in data (e.g., MDS, cluster analysis, EFA) are sample-specific to some degree, the extent to which the results of this study are generalizable is an important question. Therefore, we sought to replicate the analysis twice more: (a) with the same students 2 years later when in a different educational context—middle school—and (b) with another sample, that differed in demographic characteristics and educational contexts (i.e., racially mixed, lower income, urban, sixth grade in elementary school). These analyses comprised the second and third studies.

**Study 2**

We investigated the consistency of the spatial distribution of items from the Classroom Mastery Goal Structure, Teacher Emotional Support, Teacher Academic Support, Classroom Mutual Respect, and Task-Related Interaction scales found in the first study by replicating the analyses with data from the same students 2 years later, when they were seventh graders in middle school. Given that students clearly perceived performance goal structure as distinct from the other classroom environment constructs and that it was not our major focus, we did not include it in the replication.

**Method**

**Participants.** The 537 seventh graders came from three school districts and were the same students who participated in Study 1 held 2 years earlier. Students attended the sole middle school in their districts. They had different teachers for different subjects.

**Measures and procedure.** The survey was identical to that used in Study 1. The Cronbach’s alpha coefficients for the scales with this sample were as follows: Classroom Mastery Goal Structure ($\alpha = .80$), Teacher Emotional Support ($\alpha = .85$), Teacher Academic Support ($\alpha = .83$), Classroom Mutual Respect ($\alpha = .75$), and Task-Related Interaction ($\alpha = .80$). Students completed surveys in their math classes in the spring of 2002. This time the administration format was identical for all schools (i.e., the items were read aloud by the researchers).

**Results**

An examination of the psychometric characteristics of the items indicated that all but the three items in the Teacher Academic
Support scale had distributions that fell within the acceptable range of skewness (–1.50 to –0.10) and kurtosis (–1.06 to 2.06). Item 3 of the Teacher Academic Support scale had both high skewness (–2.34) and kurtosis (5.53). Items 2 and 4 had acceptable skewness (–1.68 and –1.75, respectively) but somewhat high kurtosis (2.58 and 2.73, respectively). We followed the same rationale as in Study 1 and kept these items in the analysis.

Means, standard deviations, and correlations among the five dimensions of the classroom climate are presented in Table 1. The pattern of correlations was similar to that found in Study 1, when the students were in fifth grade. All correlations were positive and significant. The correlations involving mastery goal structure ranged from .56 to .71. The strongest correlation was between teacher emotional support and teacher academic support (r = .77).

MDS. The pattern of fit statistics for the one-, two-, and three-dimensional models was similar to that of the previous study. The three-dimensional model provided the best fit for the data (stress = .08, $R^2 = .97$), although the two-dimensional fit was good (stress = .12, $R^2 = .94$). The one-dimension model indicated a bad fit (stress = .21, $R^2 = .87$). Again, an examination of the two- and three-dimensional solutions indicated similar organization of the items with respect to each other in the different spaces. Hence, for the same reasons as in Study 1 we present the two-dimensional solution in Figure 3.

There was a similar pattern of results compared with those from Study 1. The region formed by the Classroom Mastery Goal Structure items was located centrally among the regions of the social climate constructs. There was considerable spatial overlap with the regions of both Teacher Academic Support and Teacher Emotional Support items, and it was close in proximity to the regions of both Classroom Mutual Respect and Task-Related Interaction items.

![Figure 3. Seventh graders’ perceptions of classroom mastery goal structure and climate dimensions (Study 2).](image)

- m = classroom mastery goal structure; i = task-related interaction; r = classroom mutual respect; as = teacher academic support; es = teacher emotional support.

Discussion

The results lend support to our supposition that mastery goal structure, at least in the views of adolescents, is phenomenologically at the nexus of these different positive relational dimensions of the classroom climate and is perhaps partly composed of these dimensions. Because both this and the previous study were conducted with the same students, albeit in different contexts (elementary vs. middle school) 2 years apart, we next sought to address generalizability further by replicating the study with different participants.

Study 3

We investigated the consistency of the previous studies’ results by examining the spatial structure of different students’ responses to the same measures (i.e., Classroom Mastery Goal Structure, Teacher Emotional Support, Teacher Academic Support, Classroom Mutual Respect, Task-Related Interaction). This group of students differed from those in the previous studies in demographics and grade level.

Method

Participants. The data were collected from 736 sixth graders (52% female) from 39 classrooms within 16 elementary schools in two districts. The districts were chosen because they complemented those of the previous two studies; they were in the same state but differed economically and racially and served urban but not inner-city students. All sixth graders in those 16 schools were invited to participate, and 95% did. According to school records, 49% of the sample were African American, 44% White, 4% Hispanic, 2% Indian, and 1% Asian. Sixty-five percent of the students were eligible for free or reduced-cost lunch. Students were taught core academic subjects by the same teacher.

Measures and procedure. The measures were the same as those used in Study 1, although in this administration we used the original Classroom Mutual Respect scale (i.e., five items; Ryan & Patrick, 2001). Also, as part of reducing the length of the survey overall there was one item less in the Classroom Mastery Goal Structure scale (i.e., four items; see Appendix). The item omitted was selected on the basis of fall data from the same students. For this sample, all items were phrased in terms of schoolwork rather than being specific to math class as in the previous studies. Students completed surveys in their regular classes in the spring of 2000 using the same procedure and format as in Study 2 (i.e., same directions, items read aloud and not grouped by scale). The Cronbach’s alpha coefficients were as follows: Classroom Mastery Goal Structure ($\alpha = .75$), Teacher Emotional Support ($\alpha = .84$), Teacher Academic Support ($\alpha = .82$), Classroom Mutual Respect ($\alpha = .76$), and Task-Related Interaction ($\alpha = .71$).

Results

An examination of the psychometric characteristics of the items indicated that all but one item had distributions that fell within the acceptable range of skewness (–1.59 to –.02) and kurtosis (–1.19 to 1.53). The third Teacher Academic Support item had acceptable skewness (–1.78) but somewhat high kurtosis (2.28).
Means, standard deviations, and correlations among the five dimensions of the classroom environment are presented in Table 2. The pattern of correlations was similar to that found in the previous two studies. All correlations were positive and significant. The correlations involving mastery goal structure ranged from .64 to .69, and again the strongest was between teacher emotional support and teacher academic support ($r = .73$).

**MDS.** Consistent with the two previous studies, the three-dimensional model provided the best fit for the data (stress = .09, $R^2 = .97$), with the two-dimensional model having an acceptable fit (stress = .14, $R^2 = .93$) and the one-dimensional model a less-than-acceptable fit (stress = .23, $R^2 = .86$). Again similar to Studies 1 and 2, the items’ organization in the two- and three-dimensional solutions manifested similar characteristics to each other. For reasons of parsimony we present the two-dimensional solution. As shown in Figure 4, the results again replicated the previous findings. The Classroom Mastery Goal Structure items region captured a central location among the regions of the four social climate constructs. It overlapped somewhat with the region formed by the Classroom Mutual Respect items and was close to the region formed by the ‘Teacher Emotional Support and Teacher Academic Support’ items. As in Study 1, the region captured by the Task-Related Interaction items was slightly removed. Thus, there was again empirical support for the phenomenological overlap of mastery goal structure with these dimensions of the classroom social climate.

**Discussion**

The findings from the new sample replicated our previous results; students responded to items assessing classroom mastery goal structure in a way that corresponds strongly with the way they respond to items assessing their perceptions of the teacher promoting respect and providing support and to some degree also with the teacher promoting task-related interaction. More important perhaps, the spatial pattern that depicts the underlying structural pattern of students’ responses suggested that the mastery goal structure construct captures a central space among all of these social dimensions of the learning environment. This structural finding suggests that the mastery goal structure construct provides a phenomenological core in the psychological space of the classroom social environment. This study adds strength to the results of the previous studies because it was conducted with a quite different sample of students in yet another grade level, and the items were phrased in terms of the classroom generally rather than math specifically.

The consistent finding supporting the phenomenological centrality of mastery goal structure in the classroom social climate raises the possibility that mastery goal structure may constitute an overarching or metaconstruct, incorporating perceptions of teacher academic and emotional support as well as encouraging positive interpersonal relationships and interactions in the classroom. Testing this hypothesis was the purpose of the next study.

Table 2

<table>
<thead>
<tr>
<th>Scale/grade and variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>1. Classroom Mastery Goal Structure</td>
<td>—</td>
<td>.67</td>
<td>.67</td>
<td>.69</td>
<td>.64</td>
</tr>
<tr>
<td>2. Teacher Emotional Support</td>
<td>.66</td>
<td>—</td>
<td>.73</td>
<td>.59</td>
<td>.56</td>
</tr>
<tr>
<td>3. Teacher Academic Support</td>
<td>.67</td>
<td>.67</td>
<td>—</td>
<td>.63</td>
<td>.48</td>
</tr>
<tr>
<td>4. Classroom Mutual Respect</td>
<td>.72</td>
<td>.60</td>
<td>.61</td>
<td>—</td>
<td>.55</td>
</tr>
<tr>
<td>5. Task-Related Interaction</td>
<td>.51</td>
<td>.45</td>
<td>.36</td>
<td>.40</td>
<td>—</td>
</tr>
</tbody>
</table>

Sixth grade

<table>
<thead>
<tr>
<th>Scale/grade</th>
<th>Mean (SD)</th>
<th>Skewness/kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>M (SD)</td>
<td>3.85 (0.96)</td>
<td>$-0.76/0.04$</td>
</tr>
<tr>
<td>Skewness/kurtosis</td>
<td>$-0.04/0.39$</td>
<td>$-1.37/1.41$</td>
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</table>

Seventh grade

<table>
<thead>
<tr>
<th>Scale/grade</th>
<th>Mean (SD)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>M (SD)</td>
<td>3.69 (0.94)</td>
<td>$-0.59/0.20$</td>
</tr>
<tr>
<td>Skewness/kurtosis</td>
<td>$-0.20/0.69$</td>
<td>$-0.99/0.41$</td>
</tr>
</tbody>
</table>

**Note.** Correlations for sixth graders are shown above the diagonal and seventh graders below the diagonal. All coefficients are significant at least $p<.01$. 

![Figure 4. Sixth graders’ perceptions of classroom mastery goal structure and climate dimensions (Study 3).](image-url)
Study 4

As we mentioned at the outset, despite mastery goal structure’s having a clear conceptual definition and strong empirical support for its benefits, it is not clear what teacher behaviors students view as indicating an emphasis on mastery goals. It has been suggested that, on the basis of studies that link classroom observations with students’ reports of their classroom goal structures, academic and emotional teacher support and encouragement of classroom mutual respect and interaction among students may contribute to the perception that mastery goals are emphasized (Patrick, 2004). The previous studies employed nonmetric MDS as the analytic method for testing the structural relations among these constructs. In the current study, we complement the MDS findings by investigating the structural relations of the mastery goal structure construct and the classroom climate scales through the more conventional use of a second-order CFA. Support for the hypothesis concerning the relations between the constructs using CFA may allow a clearer convergence of findings with the achievement goal and classroom climate literatures, which commonly have used factor analytic methods. Because higher order factors invariably explain less variance in the data than do first-order factors, deciding whether to adopt the notion of a higher order factor requires balancing the loss of explanatory power with the gain in theoretical understanding and usefulness (Lance, Teachout, & Donnelly, 1992).

Method

Participants. The participants were 789 seventh graders (54% female) who attended the middle schools in the same school districts as did students in Study 3; approximately half were part of that sample the previous year. The difference in samples was due to some sixth graders’ subsequently attending middle schools not participating in the study and recruitment of new seventh graders in the middle schools.

Measures and procedure. Surveys were completed during the spring of 2001 using the same measures and procedure as in Study 3. The Cronbach’s alpha coefficients for the scales with these students were as follows: Classroom Mastery Goal Structure ($\alpha = .77$), Teacher Emotional Support ($\alpha = .77$), Teacher Academic Support ($\alpha = .81$), Classroom Mutual Respect ($\alpha = .80$), and Task-Related Interaction ($\alpha = .72$).

Results

An examination of the items’ psychometric characteristics indicated that all distributions fell within the acceptable range of skewness (−1.47 to 0.28) and kurtosis (−1.23 to 1.28). Means, standard deviations, and correlations among the five dimensions of the classroom environment are presented in Table 2. Similar to the pattern found in the three other studies, all correlations were positive and significant. The correlations involving mastery goal structure were high and ranged from .51 to .72.

CFAs. We conducted two CFAs to test the possibility that mastery goal structure constitutes an overarching construct for the other climate constructs. We began with a first-order CFA and included mastery goal structure at the same level as the four climate measures (Model 1). Second, we conducted a higher order CFA that depicted mastery goal structure as a second-order factor, with the other four climate measures functioning as its indicators (Model 2). Both Model 1, $\chi^2(160) = 698.43, p < .001$, comparative fit index (CFI) = .92, root-mean-square error of approximation (RMSEA) = .065, 90% confidence interval (CI) [.060, .070], and Model 2 fitted the data relatively well, $\chi^2(166) = 780.62, p < .001$, CFI = .91, RMSEA = .069, 90% CI [.064, .073]; however, the results for the first-order model were slightly better. A chi-square test indicated there was a significant difference between the two models’ chi-square statistics ($\Delta\chi^2 = 82.19, \Delta df = 6, p < .001$). However, in Model 2 the unique variance in the four indicator variables left unaccounted for by mastery goal structure was relatively small: 9% of teacher academic support, 8% of teacher emotional support, 20% of classroom mutual respect, and 33% of task-related interaction.

Discussion

The significant difference between the two models indicated that depicting mastery goal structure as being determined by the four social climate constructs involved losing explanatory information. However, the higher order model did fit the data well. Moreover, the unique variance in the social climate dimensions that was left unaccounted for by mastery goal structure was relatively low compared with the amount of variance explained. This suggests that mastery goal structure could indeed be conceptualized as an overarching construct accounting for much, even if not all, of various teacher behaviors perceived by students as promoting a positive social climate. More important conceptually, this finding may suggest that perceiving a positive social classroom climate is indeed an integral component of a mastery goal structure.

General Discussion

Our studies add to the understanding of classroom learning environments by integrating constructs and their measures from two research perspectives—goal structures from achievement goal theory, and four social dimensions measured in classroom climate research. We conducted three studies using nonmetric MDS—a multivariate procedure that depicts the matrix of relations among items in a spatial representation that allows exploration of hidden structures underlying the data. Results across the studies indicate that the items assessing teacher emotional support, teacher academic support, promotion of classroom mutual respect, and promotion of task-related interaction constitute phenomenologically coherent constructs. That is, items within each scale were generally perceived more similarly than were items across different scales. Furthermore, the results across the studies imply that the mastery goal structure construct is phenomenologically central to the classroom social climate constructs and partially overlaps with or is close to the meaning of social dimensions of the classroom environment. This finding, consistent across the studies, indicates that there may be significant redundant variance when assessing both social climate variables and mastery goal structure. This conclusion also fits with Miller and Murdock’s (2007) findings of redundancy among measures of perceived mastery goal structure, teacher interest in teaching, and teacher respect. Another interpretation of the current findings other than phenomenological correspondence may be that the shared variance between the social climate constructs and mastery goal structure represents a lagged psychological process in which social climate perceptions constitute...
precursors to a phenomenologically distinct mastery goal structure. These competing hypotheses should be pursued in future studies.

Another contribution of the present research is the use of MDS to investigate the complex nature of classroom environments. MDS is particularly valuable for such research because it is inclusive rather than requiring models to be pared down or variables excluded for reasons such as multicollinearity or cross-loading, as is the case for structural equation modeling, multiple regression, and factor analysis. These have been issues of concern with research on classroom mastery goal structure (Miller & Murdock, 2007; Patrick, 2004). For example, classroom climate measures were excluded from analyses that contained classroom mastery goal structure (see e.g., Midgley, 1997). Similarly, when correlations of mastery goal structure with climate measures are high, but not prohibitively so, multiple regressions can produce misleading results. For example, the finding that mastery goal structure was not related to cheating was interpreted as being due to high correlations of the former with another independent variable, perceived teacher commitment, rather than mastery goal structure not playing an important role (Murdock et al., 2001). This issue of methodological constraints limits researchers’ understanding of classroom psychological environments and hinders theoretical synthesis. MDS is particularly useful for research on highly related constructs because it was “designed to detect the hidden structure of similarity judgments” (Stalans, 1995, p. 138). Thus, the analysis can uncover the phenomenology of perceptions (e.g., of classrooms), allowing for their holistic nature as they are experienced in complex real-world environments while accounting for the conceptually, even if not phenomenologically, distinct constructs (Guttman & Greenbaum, 1998; for an educational psychology example see Kaplan, Lichtinger, & Gorodetsky, 2009).

Because analyses can produce results that are somewhat sample-specific (Stalans, 1995), we conducted analyses with separate samples of students that differed according to demographic characteristics and educational contexts and used items of different subject-level specificity. There was considerable consistency in the pattern of students’ reports across the studies. Students’ perceptions of different aspects of their classroom environment formed a remarkably similar pattern in elementary school, when they were taught by a single teacher, and 2 years later in middle school, when they had subject-specific teachers. The pattern of results for White students in middle-class, suburban families was similar to that generated by a sample of ethnically diverse students attending urban schools and from predominantly low-income families. Moreover, the pattern was consistent whether items referred to schoolwork in general or to math class specifically. This consistent pattern supports the generalizability of our findings. However, we investigated the perceptions of students in only the middle grades, and therefore it is uncertain to what extent older, or younger, students view mastery goal structure as being similar to teacher support, classroom mutual respect, and task-related interaction in the classroom. Further research is needed to address possible developmental or grade-level differences. Additionally, three of the four studies focused specifically on math classes; the other was conducted in academics generally. Given that teachers and students perceive that academic subjects differ in terms of the nature of the discipline and how they should be taught (Stodolsky & Grossman, 1995; Stodolsky, Salk, & Glaessner, 1991), it would be prudent to investigate whether the results we found in math classes and classes in general hold for other domains.

By using both MDS and CFA with the same type of data, we engaged in methodological triangulation (Tashakkori & Teddlie, 1998). These two analytic methods have different assumptions, emphases, priorities, and strengths and weaknesses and therefore can reveal different details of the associations among constructs. The results of the MDS and CFA, although not identical, depict a similar picture. Classroom mastery goal structure was perceived as being close to the climate constructs, and the test of mastery goal structure as a higher order factor composed of the climate constructs resulted in a good fit and showed considerable redundancy among measures. However, notably, the structural overlap between the climate measures and mastery goal structure was only partial, and the CFA model of all five measures as first-order factors fitted the data better. Future research should pursue the environmental conditions and individual difference characteristics that may be associated with less and more phenomenological overlap of the classroom social climate and mastery goal structure and should pursue the meaning of the nonshared variance between these sets of constructs.

The variance in mastery goal structure not shared with the social climate constructs may be accounted for by teachers’ instructional practices (e.g., scaffolding, teaching specific learning strategies). We did not measure instructional practices in our studies, but doing so would add to the present research. Other studies have shown the importance of teachers’ pedagogical competence (Brophy, 2004; Miller & Murdock, 2007; Patrick & Ryan, 2009), such as using active approaches (Meece, 1991), academic press (Middleton & Midgley, 2002), and scaffolding (Turner et al., 1998) for student motivation. However, sound instructional practices without a positive relational climate may be insufficient for students to perceive a mastery focus (Turner & Meyer, 1999). Future research that investigates the role of teachers’ instructional practices for mastery goal structure would contribute to a better understanding of the interplay between the academic and social dimensions of classroom environments.

Our studies have significant theoretical, practical, and empirical implications. With respect to theoretical implications, the results contribute to unpacking what a mastery goal structure means to students in terms of teacher behaviors. In particular, the relevance of teacher support—both for learning and for students as individuals—and classroom-wide respect for creating an emphasis on student learning and understanding is striking. The results contribute to achievement goal theory, which has focused on meanings created about academics and particularly how academic success or achievement is conceptualized (individual improvement or outperforming others). Our studies support arguments (see e.g., Kaplan, 2004; Patrick, 2004; Ryan & Shim, 2006; Turner et al., 2002; Urdan & Maehr, 1995) to broaden the focus to include relational or socioemotional aspects. Of note, doing so would bring the field back to the roots of achievement goal theory, which “grew out of . . . work on the role of social and cultural context in determining motivational patterns in performing achievement tasks” (Maehr, 1984, p. 117). In introducing the construct of classroom goal structures Ames and Ames (1984) included “how students are to relate to each other” (p. 535) along with “which goals students are to accomplish, how students are to be evaluated, and how students are to relate . . . to the task” (p. 535).
The present series of studies also extends the theoretical rationale of classroom climate research—a perspective with a long history and influence beyond motivation research (Fraser, 1998, 2000; Walberg & Anderson, 1968). For example, a classroom climate perspective is used in diverse fields such as science education (see e.g., Henderson et al., 2000), school reform (see e.g., Sinclair & Fraser, 2002; Taylor et al., 1997), pedagogical change (see e.g., Nix et al., 2005), and urban and minority student education (see e.g., Griffith, 2002; Waxman et al., 1997). Through our initial integration with achievement goal theory we have suggested theoretically grounded processes by which different classroom social dimensions may promote student achievement and engagement. That is, students’ perceptions of their teacher as promoting understanding and personal improvement may be drawn from their perceptions of the teacher’s messages about interpersonal relationships.

The present study also has important practical implications. As we noted earlier, one area of weakness for achievement goal theory research is that its recommendations for educators tend to be general and provide little information about specific practices for teachers to engage in that are likely to maximize their students’ motivation and learning. Thus, there is considerable utility in knowing that practices such as not allowing students to make fun of someone who gives the wrong answer or letting students ask others for help with schoolwork are closely associated with mastery goal structure. Sharing this information with educators is likely to be valuable for them.

With regard to empirical implications, our results suggest that the mastery goal structure construct could provide a good, parsimonious, and efficient alternative to administering numerous measures of classroom social climate in order to assess the multidimensional nature of the classroom. Alternately, when researchers want a more detailed and nuanced examination of dimensions within classrooms’ mastery goal structure, our results support using measures of teacher support, classroom mutual respect, and learning-related discussion to provide that multidimensional perspective. Thus, mastery goal structure may be conceptualized as an overarching structure composed of different but related dimensions rather than as a single construct.

References


Taylor, P. C., Fraser, B. J., & Fisher, D. L. (1997). Monitoring construc-


(Appendix follows)
Appendix

Measures of Classroom Climate and Goal Structure

Table A1
Constructs and Items

Teacher Emotional Support
1. Does your teacher respect your opinion?
2. Does your teacher really understand how you feel about things?
3. Does your teacher try to help you when you are sad or upset?
4. Can you count on your teacher for help when you need it?

Teacher Academic Support
1. Does your teacher like to see your work?
2. Does your teacher care about how much you learn?
3. Does your teacher want you to do your best in school?
4. Does your teacher like to help you learn?

Classroom Mutual Respect
1. My teacher wants us to respect each other’s opinions.
2. My teacher does not allow students to make fun of other students’ ideas in class.
3. My teacher makes sure that students don’t say anything negative about each other in class.
4. My teacher does not let us make fun of someone who gives the wrong answer.
5. My teacher wants all students to feel respected.a

Task-Related Interaction
1. My teacher allows us to discuss our work with classmates.
2. My teacher encourages us to share ideas with one another in class.
3. My teacher lets us ask other students when we need help with our work.

Classroom Mastery Goal Structure
1. My teacher wants us to understand our work, not just memorize it.
2. My teacher really wants us to enjoy learning new things.
3. My teacher gives us time to really explore and understand new ideas.
5. My teacher thinks mistakes are okay as long as we are learning.b

Classroom Performance Goal Structure
1. My teacher points out those students who get good grades as an example to all of us.
2. My teacher lets us know which students get the highest scores on a test.
3. My teacher tells us how we compare to other students.
4. My teacher makes it obvious when certain students are not doing well on their work.

Note. The fifth and seventh graders in Studies 1 and 2 were asked to think about math class when responding to the items. Items completed by the seventh graders were worded “My math teacher . . .” a Completed by only sixth and seventh graders in Studies 3 and 4. b Completed by only fifth and seventh graders in Studies 1 and 2.