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What is This?

Adolescents' Perceptions of School Environment, Engagement, and Academic Achievement in Middle School

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This short-term longitudinal research examined the relationships among middle school students' perceptions of school environment, school engagement, and academic achievement. Participants were from a representative, ethnically diverse, urban sample of 1,046 students. The findings supported the theoretical conceptualization of three different, but related, dimensions of school engagement: school participation, sense of identification with school, and use of self-regulation strategies. The results also indicated that students' perceptions of the distinct dimensions of school environment in seventh grade contribute differentially to the three types of school engagement in eighth grade. Finally, the authors found that students' perceptions of school environment influenced their academic achievement directly and indirectly through the three types of school engagement. Specifically, students' perceptions of school characteristics in seventh grade influenced their school participation, identification with school, and use of self-regulation strategies in eighth grade that occur therein and, in turn, influenced students' academic achievement in eighth grade.

KEYWORDS: adolescence, school environment, school engagement, academic achievement, middle school

Engaged students are more successful in school by many measures. Students who attend school regularly, concentrate on learning, adhere to the rules of the school, and avoid disruptive behaviors generally get better

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grades and perform better on standardized tests (Bandura, Barbaranelli, Caprar, & Pastorelli, 1996; Caraway, Tucker, Reinke, & Hall, 2003; Finn & Rock, 1997). In contrast, students who are disengaged from school and learning are more likely to perform poorly and engage in problem behaviors such as dropping out of school (Finn & Rock, 1997). Unfortunately, however, many educators characterize disengagement from schooling as one of the most immediate and persistent problems exhibited by students (e.g., Finn, 1989; Finn & Voelkl, 1993). They also note that the problem of disengagement is particularly acute during the middle and high school years (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006).

Most recent studies have defined engagement as a multidimensional construct composed of three components: behaviors, emotions, and cognitions (Fredricks, Blumenfeld, & Paris, 2004; Jimerson, Campos, & Greif, 2003). *Behavioral engagement* refers to the actions and practices that students direct toward school and learning; it includes positive conduct (e.g., attending class and completing schoolwork), involvement in learning and academic tasks (e.g., effort and concentration), and participation in extracurricular activities (Finn, 1993; Finn, Pannozzo, & Voelkl, 1995). *Emotional engagement* represents a student's affective reactions and sense of identification with school (Skinner & Belmont, 1993). *Cognitive engagement* refers to a student's self-regulated and strategic approach to learning (Fredricks et al., 2004). These three components are dynamically interrelated within individuals and are not isolated processes.

Empirical studies, however, usually examine these dimensions separately or measure engagement on a single, unidimensional scale (e.g., Lee & Smith, 1995; Marks, 2000). Defining and examining the dimensions of engagement separately may not attend to the interrelationships among these components. The practice of measuring engagement on a single scale precludes examining differences among the various types of engagement and understanding their possible antecedents and consequences (Fredricks et al., 2004). Thus, this research conceptualizes engagement as a multidimensional construct in order to better understand the antecedents and consequences of the three types of engagement simultaneously and dynamically. Specifically, we operationalize adolescents' school engagement as (a) *school participation* (type of behavioral engagement), (b) *school identification* (type of emotional engagement), and (c) *use of self-regulation strategies* (type of cognitive engagement).

A growing body of research also suggests that the social, instructional, and organizational climate of schools influences both students' engagement and their academic achievement (e.g., Eccles, Wigfield, & Scheifele, 1998; H. Patrick, Ryan, & Kaplan, 2007; A. M. Ryan & Patrick, 2001). However, it is not clear how various aspects of the school environment influence the three types of engagement (school participation, school identification, and use of self-regulation strategy) *simultaneously,* nor which mechanisms within the school environment work to affect students' academic outcomes. While

most research examines engagement as an outcome, little is known about whether the relationship between school environment and engagement leads to other distal outcomes of interest, such as academic achievement. A few studies have examined the mediating role of a single component of engagement between school context and achievement (e.g., Wigfield et al., 2008); however, the literature rarely tests the mediating effects of the three types of engagement simultaneously.

In the current study, we use a large-scale representative sample of 1,046 adolescents to investigate which features of school environment, from a student's perspective, best support or undermine school engagement and academic achievement during the middle school years. One unique feature of our sample is that there is a broad range of socioeconomic status (SES) levels in both the African American and the European American adolescents. The use of a more ethnically and socioeconomically diverse sample addresses the limitation encountered by most studies of school context and student engagement, which have been conducted primarily with White middle-class samples (Fredricks et al., 2004). In addition to utilizing a large and diverse sample, this study also examines whether school engagement mediates the associations between students' perceptions of school environment and their academic achievement.

The Impact of Perceptions of School Environment on Engagement

The theoretical framework for this study draws from self-determination theory (SDT) and also the self-system approach that comes out of SDT and focuses specifically on engagement as an outcome. SDT theorists posit that individuals seek experiences that fulfill the fundamental need for competence, autonomy, and relatedness through interaction with the environment (Deci & Ryan, 1985, 2000). The theory assumes that the degree to which students perceive that the school context meets those psychological needs determines the level of students' engagement in school. Further, in the self-system approach, school engagement is also hypothesized to be malleable and responsive to interactions between both the individual and the learning environment (Connell, 1990; Skinner & Belmont, 1993).

From the perspective of SDT, optimal learning outcomes occur in relation to how well the learning environment provides opportunities for the student to develop a sense of personal competence and autonomy and positive relationships with others (Deci & Ryan, 1985, 2000; Reeve, 2002). To the degree that school is experienced by students as supporting these fundamental needs, their engagement and achievement in school will be enhanced. *Competence* means knowing how to achieve certain results and feeling efficacious in doing so. The extent to which students feel this sense of mastery and efficacy is related to their effort and intrinsic motivation in school and their emotional reactions to learning (Skinner, Furrer, Marchand, & Kindermann, 2008). Autonomy involves the self-initiation and self-regulation of behavior. Studies

have shown that students with a greater sense of autonomy in school have better school outcomes such as classroom engagement, persistence, enjoyment, and achievement (e.g., Miserandino, 1996; B. C. Patrick, Skinner, & Connell, 1993). *Relatedness* refers to affiliation, the strength of one's connections to others within a particular context. Research has indicated that a sense of connectedness to teachers and peers in school is associated with multiple indicators of academic motivation and engagement, particularly emotional engagement (e.g., L. H. Anderman & Anderman, 1999; Furrer & Skinner, 2003; Wentzel, 1997, 1998).

Some school environments fulfill students' needs and promote their engagement more effectively than others do. We focus on five facets of school characteristics: *promotion of performance goals, promotion of mastery goals, support of autonomy, promotion of discussion,* and *teacher social support.* Below, we discuss how these school characteristics foster or undermine the fulfillment of the basic psychological needs of students, which in turn fuel their engagement in school. We expect that school characteristics fulfilling the needs of competence in students (promotion of performance and mastery goals) will be stronger predictors of both emotional and cognitive engagement in school, while school characteristics fulfilling needs of autonomy (support of autonomy) or relatedness (promotion of discussion and teacher social support) will be stronger predictors of emotional engagement.

The school characteristic we examine in relation to *support of competence* concerns the achievement goal structures that teachers emphasize through school policies and instructional practices. *Mastery goal structures* foster student perceptions that their teachers emphasize self-improvement, reward effort, and value mastery as the main goal of learning (E. M. Anderman & Midgley, 1997). In contrast, *performance goal structures* reflect the extent to which students perceive that their teachers emphasize relative ability and social comparison among students, promote competition among students, and define striving for high grades as the main goal of learning.

Researchers have found that the achievement goal structures created by schools influence students' engagement because they affect students' confidence in their abilities to master academic-related tasks (e.g., Ames, 1992; Roeser, Eccles, & Sameroff, 2000). In particular, students who perceive their teachers' advance mastery goals are more motivated to learn and tend to engage in deeper cognitive processing, such as metacognitive and self-regulation strategies, than do students who report teachers with performance goals (Meece, Blumenfeld, & Hoyle, 1988; Pintrich, 2000). These results are plausible because a focus on comparison and competition in middle school is contradictory to students' need for a safe, supportive environment in which to develop their competencies and thus undermines their feelings of commitment to school and motivation to expend more effort on school tasks (Roeser & Eccles, 1998). Therefore, we hypothesize that promoting mastery goals rather than performance goals will enhance school identification and encourage the

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use of self-regulation strategies and, to a lesser degree, increase school participation.

Students' need for autonomy in learning is promoted when they experience autonomy support. *Support of autonomy* involves students' perceptions that teachers provide opportunities to participate in decision making related to academic tasks and school governance and allow for student input into class discussion (Roeser, Eccles, & Sameroff, 1998). Such practices can promote school engagement because students have opportunities to practice their decision-making skills, regulate their behavior, and experience a sense of personal satisfaction and responsibility for influencing their learning environment (Connell & Wellborn, 1991; Reeve, Bolt, & Cai, 1999). Students are more likely to act in accordance with group decisions and identify themselves as member of the group if they have participated in forming those groups and the group norms (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Reeve, 2002; Way & Robinson, 2003). Therefore, we expect that support for autonomy will enhance school participation and the use of self-regulation strategies and, to a higher degree, promote school identification.

Adolescence is a period when relationships with nonparental adults and peers take on increased meaning because adolescents are seeking support from adults outside of the home and peer acceptance (Roeser et al., 1998). School can provide support of *relatedness* through good-quality relationships with teachers and peers. Two dimensions of school environment are examined in relation to the support of students' relatedness in school: *promotion of discussion* and *teacher social support.*

Promotion of task-related discussion refers to students' perceptions that teachers encourage students to interact and discuss ideas with one another during class. Class interaction and discussion provide opportunities for students to practice social skills and regulation of their own behaviors and emotions and experience a sense of relatedness to peers (Kasen, Johnson, & Cohen, 1990; H. Patrick et al., 2007). Teachers who emphasize more class discussion and encourage students to explain their understanding to others and debate points of view are also credited with enhancing students' metacognitive reflection in learning (Clark et al., 2003; Guthrie & Wigfield, 2000; Webb & Palincsar, 1996). Therefore, we expect that promotion of discussion will be positively associated with sense of school identification and use of self-regulation strategies. It is unclear, however, how encouraging discussion would be related to students' school participation. Promoting discussion and interaction may make it easier for students to go off task and become distracted. Conversely, creating opportunities for students to talk with one another and meet social needs may be associated with increased school participation. Therefore, we treat it as an exploratory analysis in this study.

Teacher social support describes whether students perceive their teachers to be supportive, responsive, and caring (Burchinal, Peiser-Feinberg, Pianta, & Howes, 2002). Teacher social support has been positively

associated with different indictors of behavioral engagement, including higher participation in school-related activities (Battistich, Solomon, Watson, & Schaps, 1997; Birch & Ladd, 1997) and fewer disruptive behaviors (A. M. Ryan & Patrick, 2001). Students who feel supported socially by teachers tend to exhibit a greater likelihood of complying with teachers' expectations, which reduces the likelihood that these students will engage in distracting and deviant behaviors (Hamre & Pianta, 2001; H. Patrick et al., 2007). Similarly, in a socially supportive and caring school environment, students have more positive attitudes toward academics, and they identify themselves as feeling that they belong in school because they can freely express themselves and count on teachers for support with a range of problems (e.g., Furrer & Skinner, 2003; Skinner & Belmont, 1993; Solomon, Battistich, Watson, Schaps, & Lewis, 2000). In line with this, we expect that social support of students by teachers will decrease students' school distraction and, to a greater degree, increase their school identification. There is relative paucity of empirical studies regarding the influences of teacher social support on cognitive engagement. However, in schools where teachers create a socially supportive and respectful atmosphere, we hypothesize that students will be more strategic about learning and invested in mastering the learning task since perceptions of teacher support decrease students' anxieties about task engagement (Stipek, 2002).

The Impact of Engagement on Academic Achievement

Behavioral engagement has been demonstrated to be positively associated with academic performance. Students who attend school regularly, concentrate on learning, adhere to the rules of the school, and avoid disruptive behaviors such as skipping class or fighting generally get better grades and perform better on standardized tests (Bandura et al., 1996; Caraway et al., 2003; Finn & Rock, 1997). There are relatively few empirical studies on emotional engagement and achievement. Some studies found an association between academic achievement and a combined measure of behavioral and emotional engagement. The use of combined measures, however, makes it hard to disentangle the independent contribution of different type of engagement to achievement (Fredricks et al., 2004). Studies with youth of different age groups show that school identification, measured by belonging and value, was associated with better test scores for White students but not for African American students (Voelkl, 1997). With respect to cognitive engagement, numerous studies indicate that the use of self-regulatory strategies improves learning achievement (Zimmerman, 2000). Students who use metacognitive strategies, such as regulating their attention and effort, connecting new information to existing knowledge, and monitoring and evaluating their progress, have better performance on academic outcomes (Boekarts, Pintrich, & Zeidner, 2000).
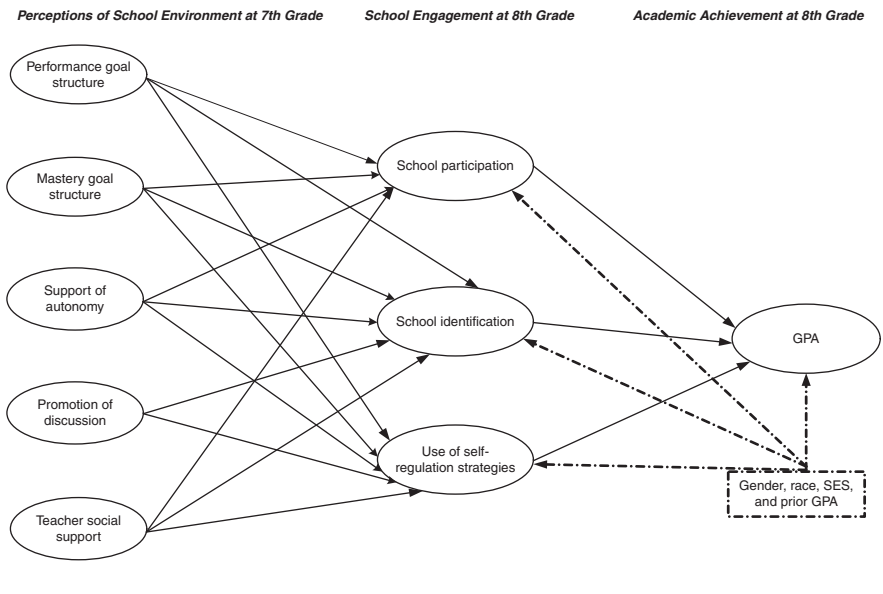
Figure 1. **Hypothesized path model with school engagement mediating perceptions of school environment and academic achievement.**
Note. GPA = grade point average; SES = socioeconomic status.

The Current Study

This study uses structural equation modeling (SEM) to investigate the links between students' perceptions of school environment, school engagement, and academic achievement simultaneously. In this study, we conceptualize students' school engagement as (a) participation in school activities, (b) school identification, and (c) use of self-regulation strategies. In addition to examining the direct relationships among students' perceptions of school environment, engagement, and academic achievement, we seek to identify the mechanisms by which school characteristics exert their influence on students' academic performance. We present our overarching research questions in the hypothesized path model in Figure 1. By fitting the hypothesized structural models to the data and estimating their parameters, we address the following specific research questions:

1. How do students' perceptions of school environment in seventh grade affect their school participation, school identification, and use of self-regulation strategies in eighth grade? How do these three types of engagement affect their academic achievement in eighth grade?
2. Do students' school participation, school identification, and use of self-regulation strategies in eighth grade mediate the association between perceived school environment in seventh grade and academic achievement in eighth grade?

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Specifically, this study hypothesized that (a) greater emphasis on performance goal structure will be associated with lower levels of school engagement; (b) greater emphasis on mastery goal structure, higher levels of support for student autonomy and discussion, and greater emotional support from teachers will be associated with higher levels of school engagement; and (c) school engagement will mediate the relationships between the five dimensions of school climate and academic achievement.

Method

Participants

Participants in the sample were part of the Maryland Adolescent Development in Context Study (MADIC; the principal investigators are Jacquelynne Eccles and Arnold Sameroff), an ongoing longitudinal study of more than 1,000 adolescents, their families, and their teachers. This data set contains rich descriptors of the effects of home, school, and peer group on adolescents' academic, emotional, and social development. Participants were from 23 public schools in a large, ethnically diverse county on the East Coast of the United States. MADIC participants have been assessed at six time points, ranging from early adolescence (seventh grade) through young adulthood (3 years after high school graduation). In the current study, we examined those adolescents who participated in two waves of the study: (a) The first wave was collected when the adolescents were in seventh grade and (b) the third wave was collected when the adolescents were at the end of eighth grade, for a total of 1,046 participants. We have chosen to focus on seventh and eighth grade because significant disengagement from school occurs from seventh to eighth grade (Murdock, 1999). Approximately 56% of participating students were African American, 32% were European American, and 12% were either biracial or other ethnic minorities. Approximately 52% of the students in the sample were females. The sample is broadly representative of different socioeconomic levels, with the mean pretax family annual income of between \$45,000 and \$49,999 (range: \$5,000 to more than \$75,000) and 86% of primary caregivers reported being employed. Of the original sample at Wave 1, 89% was retained at Wave 3. To ascertain whether the students who dropped out of the study in Wave 3 differed from the students who participated in the first two waves, a series of chi-square and *t* tests was conducted with all study variables at Wave 1. Results revealed that those who participated in the study for two waves were not statistically significant from those who dropped out of the study in Wave 3.

Procedure

Students were recruited, through a letter that was sent home, from 23 schools in one county to participate in this study. Families who were

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interested in participating in this study were asked to sign and return a consent form. Face-to-face interviews and self-administered questionnaire information were collected for Waves 1 and 3. This data collection process took place in the home, with the race of the interviewers—primarily women with bachelor's degrees—matching the race of the adolescents. The face-to-face interviews took approximately an hour, and the self-administered questionnaire took approximately 30 minutes to complete. Participating adolescents were offered $20 at each wave.

Measures

See Table 1 for an overview of the example items used in the study. Items and factors analyses were performed to ensure appropriate psychometric properties of the scales and items. We primarily analyzed students' self-report measures, but for academic achievement and family SES we used data from school report cards and primary caregivers.

Outcome Constructs

Academic achievement at eighth grade. Students' academic grade point averages (GPAs) in eighth grade were collected from their school records. GPA was an average of students' grades in the core academic subjects (English, math, science, and social sciences). Letter grades were converted into numerical values (A = 5, B = 4, C = 3, D = 2, Failing = 1).

School engagement at eighth grade. The school engagement index consisted of 14 items that measured school participation, school identification, and use of self-regulation strategies (Eccles et al., 1993). These scales have been shown to be both reliable and valid in prior research (Roeser, Eccles, & Freedman-Doan, 1999; Roeser, Strobel, & Quihuis, 2002). The items in all three components were coded appropriately so that the higher scores indicate higher school engagement.

1. *School participation*, the behavioral component, describes students' level of distraction in school. This subscale included three items that measure the extent to which the students are distracted in classes and have trouble getting schoolwork done. Responses were rated along a 5-point scale, ranging from 1 (*almost never*) to 5 (*almost always*). A sample item is "How often do you have trouble in school because it is hard for you to sit in your seat for a long time?" Item responses for this scale were reverse coded so that higher scores indicate higher school participation.

2. *School identification*, the emotional component, represents students' sense of school belonging and valuing of school. This subscale has seven items that ask students to rate their feelings about school, the degree to which they feel part of their school, and the degree to which they feel it is important to go to school. Sample items are "In general, I like school a lot" and "I have to do well in school if I want to be a success in life." The item responses ranged

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Table 1
Factor Loading for All Latent Variables

Latent Construct	Factor Loadings	
	Unstandardized	Standardized
Students' perceptions of school environment		
School performance goal structure		
1. How true is it that teachers pay too much attention to grades and not enough attention to helping students learn?	.697	.637
2. How true is it that teachers treat students who get good grades better than other students?	.903	.713
3. How true is it that teachers only care about the smart kids?	.949	.816
4. How true is that students are encouraged to compete against each other for grades?	.813	.688
School mastery goal structure		
1. How true is it that everyone can get good grades if they do their very best?	.652	.606
2. How true is it that everyone is challenged to do their very best?	.617	.546
3. How true is it that teachers want students to really understand their work, not just memorize it?	.728	.680
4. How true is that trying hard counts a lot?	.787	.720
Support of autonomy		
1. How often do students get to decide where they sit?	.678	.551
2. How often are students allowed to choose their partners for group work?	.763	.749
3. How often do students get to participate in making school rules and policy?	.703	.686
Promotion of discussion		
1. How often do students get to discuss their work in class?	.550	.470
2. How often are students' ideas and suggestions used during classroom discussions?	.659	.609
3. How often is there a lot of classroom discussion about what you are learning?	.530	.410
Teacher social support		
1. How often can you depend on teachers to help you out when you have a personal or social problem at school?	.770	.655
2. How often do you talk to teachers about how things are going in your life?	.924	.803
3. How often do your teachers really understand how you feel?	.660	.561

Table 1 **(continued)**

Latent Construct	Factor Loadings	
	Unstandardized	Standardized
School engagement		
School participation		
1. How often do you have trouble in school because it is hard for you to sit in your seat for a long time?	.599	.576
2. How often do you start daydreaming or thinking about something else when you are doing schoolwork in school?	.799	.777
3. How often do you find that it is hard for you to get homework done?	.615	.610
School identification		
1. In general, I like school a lot.	.484	.498
2. I would recommend other kids to go to the school I go to now.	.436	.401
3. I feel like I belong to the school I go to now.	.521	.593
4. I have to do well in school if I want to be a success in life.	.670	.664
5. Getting a good education is the best way for me to get ahead in life in my neighborhood.	.534	.511
6. I learn more useful things from my friends and relatives than I learn in school.	.470	.480
7. Schooling is not so important for me.	.554	.543
Use of self-regulation strategies		
1. How often do you try to decide what you are supposed to learn, rather than just read the material when you are doing school work?	.476	.431
2. How often do you try to relate what you are studying to other things you know about?	.564	.658
3. How often do you try to plan what you have to do for homework before you get started?	.642	.685
4. How often do you check your homework to make sure it's done correctly when you finish it?	.513	.557

Note. All parameter estimates significant at $p < .001$.

from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate greater school identification.

3. *Use of self-regulation strategies*, the cognitive component, captures students' perceived use of a strategic approach to learning. The factor of self-regulation strategies use includes four items. A sample item is "How often do you try to relate what you are studying to other things you know about?" Item responses

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ranged from 1 (*almost never*) to 5 (*almost always*). Higher scores indicate greater use of self-regulation strategies.

Primary Question Predictors

Perceived school environment at seventh grade. The School Climate Perception Measure (Eccles & Midgley, 1989; Midgley et al., 1995; Roeser, & Eccles, 1998) was adapted to assess students' perceptions of school environment in seventh grade. The format for all the items was a 5-point scale, raging from 1 (*almost never*) to 5 (*almost always*). These measures have been validated in prior studies with this population (e.g., Roeser & Eccles, 1998; Roeser et al., 1998).We hypothesized five latent constructs of students' perceived school environment.

1. *Promotion of performance goals* was represented by four items that measured students' perceived level of how much their teachers emphasized comparison, competition, and high grades. A sample item is "How true is it that teachers pay too much attention to grades and not enough attention to helping students learn?"
2. *Promotion of mastery goals* was represented by four items that assessed students' perceived level of how much their teachers emphasize task mastery and self-improvement. A sample item is "How true is it that everyone can get good grades if they do their very best?"
3. *Support of autonomy* was represented by three items that assessed students' perceived opportunities to make decisions related to academic tasks and school governance. A sample item is "How often do students get to participate in making rules and policy?"
4. *Promotion of discussion* was represented by three items that measured students' perceived opportunities to interact and discuss ideas with one another during class. A sample item is "How often do the students get to discuss their work in class?"
5. *Teacher social support* included three items that measured students' perceived level of care and support from teachers. A sample item is "How often can you depend on teachers to help you out when you have a personal or social problem at school?"

Control Variables

We controlled for students' gender, race/ethnicity, SES, and prior academic performance in seventh grade in the statistical models as covariates because previous research has suggested that students' prior academic achievement and demographic characteristics can influence their school engagement and achievement.

Male. A dichotomous variable indicated whether the adolescent is male (1) or female (0).

Race. We represented the student's ethnicity by three dichotomous predictors: Black (0), White (1), and other (2). We omitted Black to establish the reference category.

SES. We standardized and added the parent's current occupational status and annual family income to create a composite measure of SES, ranging from 1 (*low*) to 10 (*high; M* = 0.09, *SD* = 0.75, α = .73).

Prior academic achievement. We included students' academic GPAs in seventh grade from school records.

Data Analyses

We used SEM with Mplus 5.0 (Muthén & Muthén, 2006) to fit the hypothesized path models to data and to address the overarching research questions. Our application of SEM has advantages over traditional regression and path analyses for testing complex hypothesized relationships among multiple latent constructs (Byrne, 2001). In addition, SEM uses multiple indicators to represent and define each latent construct, permits us to tease out measurement error from these indicators, and allows us to test the fit of the hypothesized path model. A multilevel model with random effects was fitted to account for the nested nature of our data (students within 23 schools).

To understand how the school environment influences the degree and frequency with which students engage in school, we need first to understand how students perceive school environment. We expected to find individual differences in students' perceptions of school environment, and indeed, this study focuses on individual variation. However, students within the same school plausibly share some perceptions as a result of their common experience. To examine the degree of consensus among students about school environment, we estimated the intraclass correlation (the ratio of the between-classes variance and the total variance) by fitting a series of multilevel analyses in which school was a random factor with different numbers of students per school and in which each of the school climate measures were outcome variables. The results indicated that the intraclass correlations for the student reports of their school environment were between 2% and 5%. Thus, it is important to keep in mind that there are some similarities within schools in terms of how students perceive school environment, although most of the variation in school climate perceptions exists at the individual level.

In addition, we dealt with the missing data through full-information maximum likelihood estimation, allowing us to include all available data. Decisions concerning model fit of these data were based on four fit indices: the chi-square fit index, Bentler comparative fit index (CFI), Tucker-Lewis fit index (TLI), and root mean square error estimate (RMSEA). SEM literature

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suggests that model fit is excellent when the coefficient for CFI and TLI is greater than 0.95; and model fit for both is deemed adequate if the coefficient is greater than 0.90 (Byrne, 2001; Hu & Bentler, 1998). For the RMSEA, a coefficient less than 0.05 indicates an excellent fit, and a coefficient under 0.08 indicates an acceptable fit (Kline, 1998).

To address our research questions, we began by testing hypotheses about the direct effects among the five constructs of school environment, three constructs of school engagement, and academic performance. Then, we tested a set of paths for possible mediation—school participation, school identification, and use of self-regulation strategies as mediators of the associations between students' perceptions of school environment and academic achievement. We estimated indirect effects with delta method standard errors based on the Sobel's (1982) asymptotic z test. Baron and Kenny's (1986) causal step approach to identify mediation has been criticized for the lack of providing a direct hypothesis test for mediation, flexibility to deal with two or more mediators, and statistical power (see Dearing & Hamilton, 2006, for a review). Thus, researchers recommend the use of the Sobel test for large sample sizes as a more appropriate method to test mediation (Bollen & Stine, 1990; Dearing & Hamilton, 2006; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

Results

Assessing Dimensionality of School Engagement

Confirmatory factor analysis was conducted on the 14 items of school engagement to examine the hypothesized three-factor structure of engagement, including school participation, school identification, and use of self-regulation strategies. Comparisons between the three-factor model proposed in this study, a two-factor model (combining items from school participation and school identification), and a global factor model (all 14 items) were made to determine the extent to which the three-factor model fit the sample of 1,046 students. For the two-factor model, the school participation factor included both participation and identification since prior studies usually combine behavioral and emotional engagement. As illustrated in Table 2, all of the indexes indicated that the three-factor model had the best fit to the data overall, $\chi^2(24, N = 1,046) = 116.96, p < .001$; CFI = 0.938, TLI = 0.917, RMSEA = 0.041. Furthermore, the three-factor model provided a significantly better solution than the single factor model, $\Delta\chi^2(3, N = 1,046) = 643.44, p < .001$, and the two-factor model, $\Delta\chi^2 (2, N = 1,046) = 578.04, p < .001$. The results of our proposed measurement model suggest that engagement is a multidimensional construct. The three-factor structure representing school participation, school identification, and use of self-regulation strategies explains the covariances among the 14 items.

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Table 2
**Goodness-of-Fit Indicators for the Three Models
for the School Engagement Measure**

Model	χ^2	*df*	RMSEA	TLI	CFI	Model Comparison	$\Delta\chi^2$	Δdf
Model 1. Single-factor model	760.40*	27	0.162	0.746	0.809	1 vs. 3	3	643.44*
Model 2. Two-factor model[a]	694.00*	26	0.157	0.781	0.853	2 vs. 3	2	578.04*
Model 3. Three-factor model[b]	116.96*	24	0.041	0.917	0.938	–	–	–

Note. RMSEA = root mean square error of approximation; TLI = Tucker-Lewis Fit Index; CFI = comparative fit index.
[a]The two-factor model includes school participation (combining school participation and identification) and use of self-regulation strategies.
[b]The three-factor model includes school participation, school identification, and use of self-regulation strategies.
*$p < .001$.

Measurement Model

Confirmatory factor analysis verified that the hypothesized constructs measure discrete, single-latent variables. In addition, identifying measurement models provides support for subsequent SEM (Kline, 1998). All the latent variables, including five school environment factors, three school engagement factors, and one achievement factor, were allowed to intercorrelate simultaneously to specify the measurement model. The measurement model was found to provide adequate fit, $\chi^2(366, N = 1,046) = 1,105.36, p < .001$; CFI = 0.92, TLI = 0.91, RMSEA = 0.05. However, we found one item with low factor loading, below 0.35, which indicates low convergent validity. It was the item measuring mastery goals (i.e., "How true is it that teachers think how much you learn is more important than test scores or grades?"). It is conceivable that this item might be confusing to some students, who understand grades as a measure of how much teachers feel students have learned and how much effort teachers feel students have expended, rather than as an index by which students can be compared. In addition, according to mediation indices, there were two items with loadings above 0.35 on other scales, which indicates low divergent validity. They were items measuring performance goal structure (i.e., "Teachers have given up on some of their students") and support of autonomy (i.e., "Do the teachers lecture too much?"). The first item differed from the other items in the performance goal scale because it asked students to make a categorical judgment: Did or did not teachers give up on some students? In contrast, all other items in the

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Table 3
**Means, Standard Deviations, and Intercorrelations Among
All Latent Variables (*N* = 1,046)**

Variable	1	2	3	4	5	6	7	8	9
1. School performance goal structure	1.00								
2. School mastery goal structure	−.34	1.00							
3. Support of autonomy	−.23	.43	1.00						
4. Promotion of discussion	−.08	.20	.40	1.00					
5. Teacher social support	−.25	.31	.29	.23	1.00				
6. School participation	−.26	.18	.17	.05ᵃ	.19	1.00			
7. School identification	−.38	.35	.31	.17	.26	.25	1.00		
8. Use of self-regulation strategies	.09	.36	.29	.19	.21	.21	.27	1.00	
9. Grade point average	−.22	.10	.13	.13	.10	.17	.23	.18	1.00
Mean	2.64	3.87	3.47	2.75	2.73	3.23	3.30	3.30	3.70
Standard deviation	0.94	0.82	0.81	0.80	0.92	0.87	0.81	0.77	0.85
Internal consistency (α)	.82	.74	.77	.72	.76	.72	.74	.76	.76

Note. All coefficients are significant ($p < .01$), except for the association between promotion of discussion and school participation.
ᵃNot significant.

performance goal scale implied a continuum, either in terms of the truth of a statement or in the priorities of teachers (e.g., "How true is it that teachers treat students who get good grades better than other students?"). The second questionable item is unique among items in the autonomy scale in that it focuses on a behavior of the teacher as opposed to the behaviors of students. Thus, we dropped the item with low factor loading and the two items with cross loadings from further analyses. The remaining standardized loadings ranged from 0.43 to 0.85 and were all statistically significant at the .05 level (see Table 1). The revised measurement model, after removing these items, was found to provide better fit for these data, $\chi^2(369, N = 1,046) = 966.28, p < .001$; CFI = 0.93, TLI = 0.92, RMSEA = 0.04.

Table 3 presents the means, standard deviations, and correlations among the latent constructs in the model. We found an expected pattern of bivariate correlations. Promotion of mastery goals, autonomy, discussion, and teacher social support were positively associated with school participation, school identification, use of self-regulation strategies, and GPA. Promotion of performance goals was negatively associated with school participation, school identification, and GPA but positively associated with use of self-regulation strategies. All variables appeared to have low to moderate correlations (from .05 to .43), allowing us to eliminate the problems of multicollinearity (Kline, 2005).
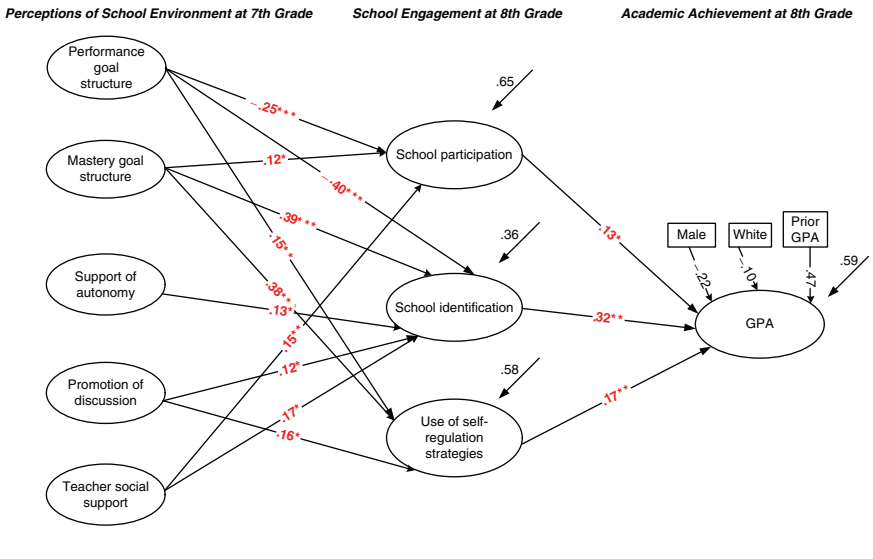
Figure 2. **Standardized coefficients for model of school engagement mediating the relations between perceptions of school environment and academic performance (*N* = 1,046).**

Note. Only significant paths (*p* < .05) are shown.

Examining Relations Between Perceived School Environment, School Engagement, and Academic Achievement

Figure 2 presents the standardized path coefficients for the final model, with significant paths only. The overall model fit was good, $\chi^2(418, N = 1,046) = 1,113.90$, $p < .001$; CFI = 0.93, TLI = 0.92, RMSEA = 0.04, and the model accounted for a large portion of the variance in the outcomes ($R^2 = .35$, .64, and .42 for school participation, school identification, and use of self-regulation strategies, respectively; $R^2 = .41$ for GPA). The examination of the modification indices suggested that there were no significant cross loadings. For the sake of clarity, we first describe the direct paths within the model. In these analyses, we examined whether each school's characteristics predicted the school participation, identification with school, and use of self-regulation strategies that occurred therein and whether the three types of engagement, in turn, predicted the outcome of students' GPAs. After describing direct relationships, we then present findings from mediation analyses.

Testing direct paths between perceptions of school environment in seventh grade and engagement in eighth grade. As seen in Figure 2, students' perceptions that their teachers promote mastery goals and provide social support

were positively associated with school participation (β = .12 and .15, respectively), while perceived promotion of performance goals was negatively associated with school participation (β = −.25). Contrary to our hypothesis, support of autonomy was not associated with school participation. In addition, students who felt their teachers promoted mastery goals, autonomy, and discussion and provided social support tended to have higher school identification (β = .39, .13, .12, and .17, respectively), while perceived promotion of performance goals was negatively associated with school identification (β = −.40). Finally, promotion of performance goals, mastery goals, and discussion were all positively associated with use of self-regulation strategies (β = .15, .38, and .16, respectively). Contrary to our hypotheses, support of autonomy and teacher social support were not associated with self-regulation strategies use.

Testing direct paths between school engagement in eighth grade and academic performance in eighth grade. Greater school participation, school identification, and use of self-regulation strategies were positively associated with GPA (β = .13, .32, and .17, respectively).

Testing direct paths between perceptions of school environment in seventh grade and academic performance in eighth grade. We also tested the direct paths from the perceived school environment variables to school GPA. After controlling for GPA in seventh grade, gender, race, and SES, the results indicated that all perceived school environment variables significantly contributed to GPA in eighth grade (β = −.21, p < .001, for promoting performance goals; β = .14, p < .05, for promoting mastery goals; β = .25, p < .001, for autonomy support; β = .22, p < .001, for promoting discussion; β = .13, p < .05, for teacher social support). The perceived school climate variables and individual differences in gender, race, SES, and prior achievement together explained 34% of the variance in school GPA.

Testing mediated relations. Table 4 presents the results of mediation tests based on the Sobel test. Our findings indicated that student level of school participation partially mediated the associations of promotion of performance goals, mastery goals, and teacher social support to academic performance. The effects of teacher emphasis of achievement goal structures and teacher social support on student academic performance were partly explained by the degree to which students actively participated in school. Furthermore, student school identification partially mediated the associations of teacher promotion of performance goals, mastery goals, support of autonomy and discussion, and teacher social support to student academic performance. Specifically, students who reported that their teachers emphasized mastery goals, autonomy, and discussion and provided social support reported higher academic performance than did students who reported that

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Table 4
Sobel Tests of Mediation

Mediated Pathway	Z	p
School climate perception in 7th grade → school engagement		
in 8th grade → academic achievement in 8th grade		
Promoting performance goals → school participation → GPA	−1.93	.054
Promoting mastery goals → school participation → GPA	1.98	.048
Teacher social support → school participation → GPA	2.01	.044
Promoting performance goals → school identification → GPA	−2.91	.004
Promoting mastery goals → school identification → GPA	2.71	.007
Support of autonomy → school identification → GPA	1.99	.047
Promotion of discussion → school identification → GPA	1.97	.048
Teacher social support → school identification → GPA	2.04	.042
Promoting performance goals → use of self-regulation strategies → GPA	2.09	.037
Promoting mastery goals → use of self-regulation strategies → GPA	2.64	.008
Promotion of discussion → use of self-regulation strategies → GPA	1.95	.051

Note. GPA = grade point average.

their teachers emphasized performance goals. This effect was mediated, however, by the extent to which students reported a sense of belonging to and valuing school, with more emotionally engaged students reporting higher academic performance. Finally, students' use of self-regulation strategies partially mediated the associations of perceived promotion of performance goals, mastery goals, and discussion to students' academic performance. For those who reported being self-regulating and strategic about learning, students who perceived high levels of performance goals, mastery goals, and class discussion tended to have higher academic achievement.

Testing Alternative Models

Research from SDT has presumed a causal sequence that the perceived school environment contributes to individual engagement with school, which in turn leads to achievement (e.g., Deci & Ryan, 2000). However, it also has been suggested that student engagement and academic achievement are likely to be reciprocal, especially when school engagement and achievement were measured at the same time point in the study. Thus, we tested an alternative model whereby academic achievement mediated associations between students' perceptions of school environment and school engagement. The fit of this alternative model, $X^2(426, N = 1,046) = 1,549.11, p < .001$; CFI = 0.87, TLI = 0.85, RMSEA = 0.05), was not as good as the fit of our originally proposed model. The ΔX^2 difference test between our proposed model and the alternative model showed that model fit decrease was significant, $\Delta X^2(8, N = 1,046) = 436.79, p < .001$. In addition, a comparison of the significant

paths in the hypothesized model and the alternative model suggests that the proposed model provides a better depiction of mediation. The magnitude of associations between the school environment variables and school engagement did not change after the inclusion of the mediators of academic achievement, which indicates that academic achievement did not act as a mediator between school environment and school engagement. Therefore, the results of testing alternative models provide a stronger rationale for our proposed temporal order in this study.

Discussion

The findings of the current study support the theoretical conceptualization of three different but related dimensions of school engagement: behavioral (operationalized as school participation), emotional (school identification), and cognitive (use of self-regulation strategies). Results indicate that students' perceptions of distinct dimensions of the school environment in seventh grade contribute differentially to the three types of school engagement in eighth grade. Each type of school engagement also affects academic performance differently. Finally, we found that students' perceptions of school environment directly and indirectly influence academic achievement through their impact on the three types of school engagement.

Our study demonstrates that students' school experiences are significantly associated with their school engagement. But which *specific features* of the school environment may support or hinder a student's positive engagement in school? We first discuss the results about school instructional and organizational processes in support of competence.

The achievement goal structures that teachers emphasize, in particular, appear to play a critical role in how the school environment affects students' engagement (R. Butler, 2006; Church, Elliot, & Gable, 2001; Smith, Sansone, & White, 2007). As expected, we found that teachers can best promote students' positive identification with school and stimulate their willingness to participate in their tasks by offering positive and improvement-based praise and emphasizing effort while avoiding pressuring students for correct answers or high grades (mastery goal structure). This type of school climate allows students to have more opportunities to feel successful (Linnenbrink & Pintrich, 2002). Instead of simply indexing students against external normative standards, mastery approaches foster students' sense of competence by emphasizing and highlighting what students have mastered. A mastery goal structure also provides more opportunities for students to work together rather than compete against each other in order to achieve their own individual goals for improvement (Linnenbrink, 2005).

Conversely, results from our study demonstrate that the presence of competitive learning environments (performance goal structures) decreases school participation, undermines the development of sense of school

belonging, and diminishes the value students place on school. In turn, this leads to lower academic achievement. Moreover, the relationships found between students' perceptions of a school performance goal structure and their school participation and identification were stronger than those found for perceptions of a school mastery goal structure, as indicated by the size of the beta coefficients. A focus on comparison, competition, and relative ability in middle school seems to be behaviorally and emotionally detrimental for students. Such an emphasis ignores students' need for a safe, supportive environment to develop their competencies and to believe that they can determine their success and succeed. If and when a student is concerned that he or she does not "measure up" on goals for performance, his or her sense of belonging and commitment to the school may be eroded (Roeser et al., 1998). This may be particularly true during adolescence because youth are increasingly self-conscious and more sensitive to social comparisons of their competencies to those of their peers (Midgley, 1993).

Consistent with prior studies (Middleton & Midgley, 1997; Pintrich, 2000; Wolters, Yu, & Pintrich, 1996), students' perceptions of being in a class in which the teacher encouraged the development of personal mastery and self-improvement made the strongest contributions to students' confidence and use of self-regulatory strategies. This suggests that when students feel their efforts and abilities are recognized and when they do not fear being embarrassed or compared to peers, they are more likely to use cognitive strategies that contribute to academic success and more likely to feel confident in their ability to learn (see A. M. Ryan & Patrick, 2001).

However, although an emphasis on performance goals decreases school participation and identification with school, our findings, along with results from Elliot and Harackiewicz (1996) and Wolters et al. (1996), suggest that the use of social comparison and competition in school (performance goal structure) does not necessarily result in maladaptive cognitive outcomes and can actually be adaptive in the school context. We found that performance goal structure and mastery goal structure are both beneficial for enhancing self-regulatory strategy use. From a self-regulated learning perspective (D. Butler & Winne, 1995), a performance goal structure could help students regulate their motivation and cognition because it would provide an additional external reference (doing better than others) by which to judge performance, particularly when that structure focuses on performance approach goals (Pintrich, 2000). In addition, a focus on competition with others could function as a motivational strategy of self-regulation (Pintrich, Roeser, & De Groot, 1994) that students use to motivate themselves in the face of easy or boring tasks (Elliot & Harackiewicz, 1996). At the same time, our results must be interpreted with caution because we did not account for different levels of student achievement. It is possible that low-achieving students who cannot compete with others on even the easiest academic tasks may not benefit from a performance goal structure (Wolters et al., 1996).

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With respect to support for autonomy, we hypothesized and previous research has shown that when students' needs for autonomy are met, students will be more likely to participate in school tasks, feel more positive about membership in the school or class community, and engage in higher levels of self-regulated learning. These hypotheses were only partially supported. We found that support of autonomy proved to be effective on increasing students' sense of school identification. Contrary to our hypotheses, however, students' perceived promotion of autonomy was not related to self-regulatory strategy use and school participation. Research indicates that provisions of autonomy and decision-making opportunities for students to participate in their learning are important components or precursors to create a learning environment (Urdan & Midgley, 2003). Thus, given the significant correlations between promotion of autonomy and mastery goal structure in this study ($\beta = .43$), it is possible that some of the explained variance contributed by autonomy support to self-regulatory strategy use overlapped with that contributed by mastery goal structure, and this overlap may have attenuated the associations. Alternatively, it could be that students' perceptions of autonomy support were indirectly associated with self-regulatory strategy use through other dimensions of school climate. For example, students who perceived their school as promoting autonomy were more likely to report more discussion opportunities (e.g., Midgley, Kaplan, & Middleton, 2001; Roeser et al., 2000) and thus felt more cognitively engaged (H. Patrick et al., 2007).

It is surprising to note that students' perceptions of the organizational and instructional practices in support of autonomy were unrelated to students' reports of how easy or difficult they found it to attend to school work (school participation). However, this finding, consistent with SDT (Deci & Ryan, 1985; R. Ryan & Deci, 2002), suggests that teachers' promotion of autonomy within middle school contexts is important but not sufficient to help students engage in and attend to learning tasks. Optimal behavioral engagement, characterized by active participation and involvement in learning, is a function of both perceived structure or control centered on the provision of competence and support of autonomy (B. C. Patrick et al., 1993). In other words, student freedom to design or shape learning without a corresponding focus or commitment to increasing competence or without any kind of accountability to task (mastery) or outcomes (performance) is unlikely on its own to lead to either behavioral engagement or learning (Deci & Ryan, 1985; B. C. Patrick et al., 1993). This finding has practical implications for teachers. Students who are competent but either alienated from school or less intrinsically motivated may need more autonomy support in the form of more interesting and relevant activities and decision-making opportunities in order to become engaged with learning. On the other hand, students who are passive or anxious about exercising autonomy or attempting novel tasks may need more structured scaffolding of tasks,

more guidance, and more explicit instruction in effective strategies before they fully engage with classroom learning (Newmann & Wehlage, 1993).

With respect to support for relatedness, consistent with prior studies (e.g., Battistich et al., 1997; Connell & Wellborn, 1991; H. Patrick et al., 2007), we found that students who reported being encouraged to interact and discuss ideas with each other in class reported higher levels of school identification and use of self-regulatory strategies (Guthrie & Wigfield, 2000). Moreover, students are more likely to participate in school and bond with school when teachers create a caring and socially supportive environment, because such school contexts meet students' needs for relatedness. Although the need to connect and belong is likely to be pervasive throughout a person's life, research has suggested that during the period of adolescence the need to connect with others through mutually supportive relationship is at its peak (Midgley, Feldlaufer, & Eccles, 1989). Therefore, it is reasonable to expect positive associations between teacher social support and students' school participation and identification. However, contrary to our expectations, teacher social support was not associated with students' use of self-regulation strategies. This finding contradicts other studies of teacher support on students' cognitive engagement (Stipek, 2002). This discrepancy may be due to the different aspects of teacher support measures that were used across studies. Teacher support can be either academic or social, but most studies combine items about the two into one scale (Wentzel, 1997). In our study, teacher support focused on students' perceptions of whether they could depend on teachers in the school for help when they had personal or social problems. Therefore, it is possible that if teachers focus only on the social aspect but fail to attend to the academic aspect, students are less likely to be cognitively engaged in learning. Future study should distinguish the two dimensions of teacher support in order to identify their individual effects on students' cognitive engagement.

The inclusion of multiple components of engagement in the same study allowed us to look at their relative strength in predicting academic outcomes. In this study, school identification—the emotional component—is particularly influential on students' academic achievement. During adolescence, when schooling plays a dominant role in youngsters' everyday lives, positive identification with school may particularly encourage successful school outcomes (Schiefele, Krapp, & Winteler, 1992; Voelkl, 1997). Positive school identification indicates students' integration of the aims of schooling in their emerging identities and also the existence of a good psychological fit between their developmental needs and their school environment (Eccles & Midgley, 1989; Roeser et al., 1998).

The magnitude of the association between cognitive engagement (use of self-regulation strategies) and achievement was not as strong as prior studies suggested (e.g., Nota, Soresi, & Zimmerman, 2004; Zimmerman, 1989; Zimmerman & Martinez-Pons, 1988). Our measure of self-regulated learning

may not capture this construct as fully as other more specific measures do. For example, Zimmerman and Martinez-Pons (1988) identified 14 commonly used self-regulated learning strategies, whereas our self-regulated learning measure includes only 4 of them. Another possibility is that the multidimensional approach enables us to disentangle the unique role each type of engagement plays in achievement when different aspects of engagement are considered together. Thus, some of the effects of self-regulatory strategies on achievement may actually be captured by other dimensions of engagement. Future research should examine how different types of engagement influence each other (Guthrie & Wigfield, 2000). For instance, it is likely that strong school identification leads to increased participation in school and greater use of metacognitive strategies, both of which mediate subsequent achievement.

The current study provides empirical support for the hypotheses that perceptions of school environment influence adolescents' behavioral, affective, and cognitive engagement in school, which in turn influence their academic achievement. In testing a mediational model, where the positive impact of school environment on academic performance is channeled through different dimensions of school engagement, our study strengthens the assertion that with the proper school climate supports adolescents can experience enhanced learning engagement and academic achievement. With a thorough understanding of how school climate serves as a protective factor against further disengagement problems, schools can establish effective preventions and learning environments to promote adolescents' engagement and academic achievement.

Implications for Practice

The study of engagement as a multidimensional construct and as an interaction between the individual and the school environment helps teachers to better understand the complexity of students' experiences in school. It enables practitioners to craft nuanced practices and environments that enhance school engagement. For example, teachers can support students' need for competence and enhance their school participation and identification by creating school environments that emphasize individual mastery and self-improvement rather than just emphasizing how students measure up against external benchmarks. They can be aware that heavy emphasis on competition, comparison, and pursuit of high grades or test scores may erode students' participation and sense of emotional connection with their schools. Unfortunately, such emphases are increasing in many schools due to the accountability pressures many schools face (Valli & Chambliss, 2007). Subsequent research needs to explicitly examine whether an increase in performance accountability has differential effects on the academic achievement, school engagement, and value placed on schools by students in different groups—including girls and boys and students of different ethnicities and levels of privilege.

Limitations

The current study has several limitations. First, the present data mainly rely upon self-report information from students to assess perceptions of school context and school engagement, which raises an important validity concern. Students may be influenced by social demands to answer in a socially desirable direction either about their own behavior or about their teachers' behaviors, thus introducing bias into the results. For instance, students may report increased (or decreased) levels of emotional or cognitive engagement in order to be more socially desirable. Thus, the future use of multiple sources of information (informants, teachers, principals, parents) and multiple methodologies (interviews, observations, surveys) can provide a more robust, valid method of identifying school effects (Richards, Gottfredson & Gottfredson, 1991; Roeser & Eccles, 1998). Second, the study did not distinguish between the approach and avoid components of performance goals (Middleton & Midgley, 1997). It is plausible that performance-approach goals are not necessarily always as maladaptive as performance-avoid goals. Future research should investigate their differential effects on school engagement. Third, the nonexperimental nature of the study limits our ability to make causal inferences. The effect of students' perceptions of school environment was not exogenous, and therefore the effect might be affected by other observed and unobserved variables. Future studies should consider examining these relationships through longitudinal study with more than two waves to address reciprocal effects over time. Fourth, this study did not specify subject areas. Incorporating domain-specific measures can help determine to what extent engagement is content specific and can help to not confound aspects of the classroom context with subject area (A. M. Ryan & Patrick, 2001). It would also be helpful to compare the impact of school climate on students' engagement among different subjects. Finally, we only examined the impact of school context on adolescents' school engagement and academic achievement. It would be more thorough and comprehensive to take into account other contexts such as family, peer group, and neighborhood. Further investigation is warranted to examine the effects of multiple contexts on adolescents' school engagement.

Note

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