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School context, achievement motivation, and academic engagement: A longitudinal study of school engagement using a multidimensional perspective

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ABSTRACT

This longitudinal study adopts a multidimensional perspective to examine the relationships between middle school students' perceptions of the school environment (structure support, provision of choice, teaching for relevance, teacher and peer emotional support), achievement motivation (academic self-concept and subjective task value), and school engagement (behavioral, emotional, and cognitive engagement). Participants were from an ethnically diverse, urban sample of 1157 adolescents. The findings indicated that student perceptions of distinct aspects of the school environment contributed differentially to the three types of school engagement. In addition, these associations were fully or partially mediated by achievement motivation. Specifically, student perceptions of the school environment influenced their achievement motivation and in turn influenced all three types of school engagement, although in different ways. Moderation effects of gender, ethnicity, and academic ability were also discussed.

1. Introduction

Active engagement in school is critical to student educational success (Finn & Rock, 1997; Wang & Holcombe, 2010). Youth must be actively engaged with their school education in order to acquire the knowledge and skills required for a successful transition into postsecondary programs and careers (Wang & Eccles, 2012a, 2012b). School engagement is also a malleable state that can be shaped by school context, therefore holding tremendous potential as a locus for interventions (Appleton, Christenson, Kim, & Reschly, 2006; Jimmerson, Campos, & Grief, 2003). Currently, and particularly at the secondary level, increasing student engagement is an explicit goal of many school reform efforts aimed at addressing problems of student boredom and alienation, low achievement, and high dropout rate (Marks, 2000).

In order to promote school engagement, we must first better understand the school factors that influence student engagement. Self-determination theorists suggest that individuals seek experiences that fulfill their fundamental needs and identities through their interaction with the environment. According to this view, student engagement in school is influenced by the degree to which they perceive that the school context meets their psychological needs (Connell & Wellborn, 1991; Deci & Ryan, 2000; Krapp, 2005). Stage-environment fit and expectancy-value theorists (Eccles et al., 1993; Roeser, Eccles, & Sameroff, 1998) further argue that the failure of schools to meet the psychological needs of adolescents often leads to declines in academic motivation and interest, which in turn contributes to decreased school engagement and poor academic performance as adolescents transition to middle school. Most of the extant research, however, has failed to capture the dynamic and interactive nature of engagement. Specifically, few empirical studies have focused on how school characteristics interact with and influence various forms of school engagement simultaneously. Moreover, research has not yet fully explained the actual process that accounts for the effect of the school environment on student engagement. It is unclear whether various aspects of the school environment influence the behavioral, emotional, and cognitive engagement differentially and whether the associations between the school environment and engagement are mediated by more fundamental motivational beliefs within the student. Therefore, there is a critical need for research that takes an integrative motivational approach to investigate the contextual and psychological factors that predict school engagement (Fredricks, Blumenfeld, & Paris, 2004). Such research could contribute to the knowledge

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base that informs effective school practices and to the efforts of researchers and educators who do the important work of identifying the optimal developmental correlates of school engagement.

In this study we adopt a multidimensional perspective, using a large-scale sample of ethnically diverse students to investigate the longitudinal associations among school environment, achievement motivation, and school engagement during the middle school years. In particular, we expand on previous research by examining whether school environment influences student engagement in school both directly and indirectly through achievement motivation and whether these associations differ by student gender, ethnicity, and academic ability. The study of school engagement as a multidimensional construct, and as an interaction between the individual and the school environment, will aid in identifying the particular school characteristics that foster student engagement and increase our understanding of the mechanisms through which they operate.

1.1. Theoretical frameworks for school engagement

Self-determination theory and *stage-environment fit theory* posit that engagement is manifested in the quality of students' interactions with learning activities and academic tasks (Deci & Ryan, 2000; Eccles, 2004; Skinner & Wellborn, 1994). Engagement is thus conceptualized as consisting of multiple distinguishable features, including behavior, emotion, and cognition (Fredricks et al., 2004; Jimmerson et al., 2003). *Behavioral engagement* refers to the actions and practices that students direct toward school and learning, including positive conduct and absence of disruptive behavior, as well as involvement in learning and academic tasks (Connell, 1990; Finn, 1989). *Emotional engagement* represents a student's positive affective reactions to, interest in, and valuing of school activities (Voelkl, 1997). *Cognitive engagement* refers to students' cognitive investment in learning, including mental efforts directed toward learning, use of self-regulated strategies to learn and master concepts, and willingness to exert necessary efforts for comprehension of complex ideas (Corno & Mansinach, 1983; Zimmerman, 1990). These three components of school engagement are dynamically embedded within the individual and provide a rich characterization of how students act, feel, and think (Wang & Peck, 2013).

School engagement is optimized when students perceive that the school context fulfills their needs for competence, autonomy, and relatedness (Connell & Wellborn, 1991; Deci & Ryan, 2000). Competence refers to the need to experience oneself as effective in one's interactions with the social environment (Elliot & Dweck, 2005), and a student's need for competence is fulfilled when they know how to effectively achieve desired outcomes (Skinner & Belmont, 1993). Autonomy refers to the extent to which an individual experiences oneself as the source of action. Autonomy is supported when a student perceives schoolwork as relevant to his or her interests and goals or when a student experiences choice in determining his or her own behavior (Assor, Kaplan, & Roth, 2002). Finally, relatedness refers to the need to experience oneself as connected to other people (Connell & Wellborn, 1991). Fulfillment of the need for relatedness is likely to occur when teachers and peers create a caring and supportive environment.

Expectancy-value theory provides a theoretical foundation for a mediational model that links school characteristics to school engagement and performance through student motivational beliefs (i.e., academic self-concept and subjective task values). According to expectancy-value theory, achievement-related choices such as school engagement are influenced psychologically by the individual's expectation for success and subjective valuing of the academic work (see Eccles, 2007); students most likely to engage in school learning place higher value and have greater confidence in their academic abilities than those who do not. Expectancy-value theory also links individual differences in motivational beliefs to the experiences that individuals have in school contexts. Teachers create opportunities for students to engage in a variety of school activities (Eccles et al., 1993; Eccles & Wigfield, 2002), and these experiences provide students with information regarding their competency to succeed, their relatedness to others in that setting, and their autonomy as learners—allowing them to realize their personal and social identities (Connell & Wellborn, 1991). This information cumulates to influence the development of self-concepts of one's ability and subjective task values for the types of activities to which the student is exposed. These motivational beliefs, in turn, influence student engagement in various educational activities (Simpkins, Davis-Kean, & Eccles, 2006). Drawing on these theoretical frameworks, school engagement results from an interaction of the individual with his/her context and is responsive to both variations in factors of the school environment and motivational characteristics (see Fig. 1).

1.2. The link between perception of school environment and school engagement

Research suggests that the fit between adolescents' psychological needs and their school environment influences both motivation and school engagement (Alonso-Tapia & Pardo, 2006; Skinner, Furrer, Marchand, & Kindermann, 2008; Wigfield, Eccles, Davis-Kean, Roeser, & Scheifele, 2006). *Self-determination* theorists and *stage-environment fit* theorists argue that 'fit' is optimized when the school context provides adequate support for the development and maintenance of a student's sense of competence, autonomy, and relatedness (Deci & Ryan, 2000; Eccles et al., 1993; Wigfield et al.,

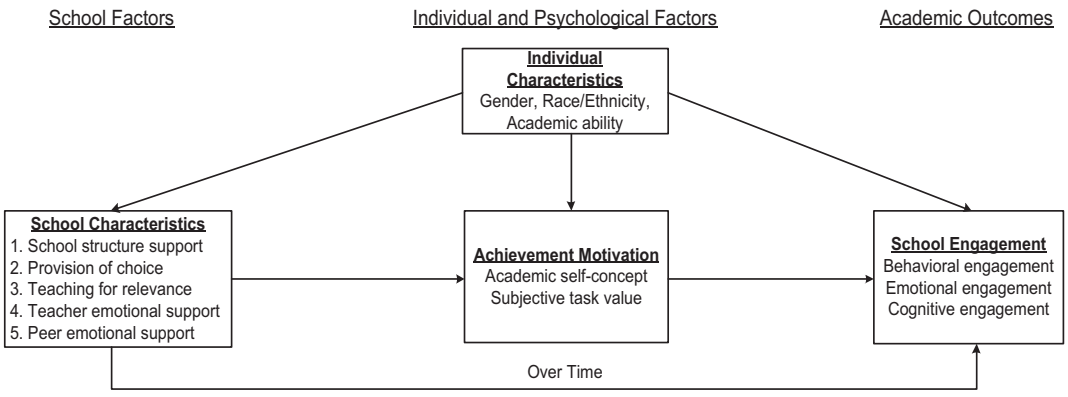

Fig. 1. Conceptual model.

2006). Here we integrate the academic and social aspects of the school environment and discuss how these school characteristics either foster or inhibit the fulfillment of the basic psychological needs of adolescents, which in turn impacts their engagement in school.

School structure support. The need for competence is met when school is experienced as being optimally structured (Skinner & Belmont, 1993). Structure refers to the school experiences being organized in such a way that a student comes to know what it means and what it takes to be successful in that context (Skinner & Belmont, 1993). When teachers are clear about their expectations, provide consistent responses, and adjust instructional strategies to the level of the student, they provide structure, which supports greater behavioral participation in academic tasks, and they foster a stronger sense of connectedness to school amongst students (Connell, 1990; Urdan & Midgley, 2003). Indeed, Skinner and Belmont (1993) found that students whose teachers are clear in their expectations and provide consistent responses are more behaviorally and emotionally engaged. Thus, we expect that school structure support will encourage behavioral engagement and enhance emotional engagement (Hypothesis 1a).

Teachers can support *autonomy* by allowing students latitude in their learning activities and by making connections between school activities and students' personal interests and goals (Skinner & Belmont, 1993; Skinner et al., 2008). We examine two aspects of school environment in relation to support of student autonomy: provision of choice and teaching for relevance to the student.

Provision of choice involves students' perceptions that their teachers provide opportunities for participation in decision making related to academic tasks and school governance and that they allow for student input into class discussion. These perceived characteristics predict greater behavioral engagement with school tasks and higher school identification (Katz & Assor, 2006; Reeve, Bolt, & Cai, 1999). Eccles et al. (1993) argued that the lack of decision-making opportunities for students help to explain declines in both interest and valuing of school during the transition to middle school. Provision of choice can promote school engagement: giving students opportunities to practice their decision-making skills, to regulate their behavior, and to experience a sense of personal satisfaction and responsibility as they exert influence upon their learning environment (Assor et al., 2002). Therefore, we expect that teacher support for student choice and input will promote behavioral and emotional engagement (Hypothesis 1b).

Teaching for relevance. Students feel a sense of autonomy when doing work that, rather than simply fulfilling school requirements, relates to their interests and has personal meaning (Roeser et al., 1998); that is, when students believe that the content of the curriculum and the design of instruction provide opportunities for self-exploration and when the activities provided are meaningful, relevant, and related to personal interests and goals (Finn & Voelkl, 1993), they feel a sense of autonomy. Additionally, meaningful curricula and instruction provide an appropriate level of challenge and a context that can encourage diverse cognitive strategies (e.g., opinion formulation, comprehension, and connection) and promote cognitive engagement (Helme & Clarke, 2001; Wigfield et al., 2006). Therefore, we expect that teaching for relevance to the student will encourage both emotional and cognitive engagement (Hypothesis 1c).

Teacher emotional support has been positively associated with different indicators of behavioral engagement, including higher participation in school activities (Battistich, Soloman, Watson, & Schaps, 1997) and fewer disruptive behaviors (Patrick, Ryan, & Kaplan, 2007; Ryan & Patrick, 2001; Wang, Brinkworth, & Eccles, 2013). Similarly, in an emotionally supportive and caring school environment, students are more willing to open ideas up for discussion, demonstrate more positive attitudes toward academic studies, and express feelings of enjoyment as they can freely express themselves and count on teachers for support with a range of problems (e.g., Furrer & Skinner, 2003; Shim, Cho, & Wang, 2013). Thus, we expect that feeling emotionally supported by teachers will increase student behavioral, emotional, and cognitive engagement (Hypothesis 1d).

Peer emotional support is also important for school engagement, especially during adolescence when youth have a great need for peer relatedness. Several studies have demonstrated that adolescents who have positive interactions with peers are more engaged both behaviorally and emotionally in school (e.g., Wentzel, 2003). These associations are most likely due to feeling supported and cared for by one's peers, fulfilling the adolescent need for relatedness and promoting the development of a sense of satisfaction in school. Although there is little evidence that peer emotional support is related to cognitive engagement, we are inclined to believe that when adolescents feel peer acceptance for academic achievement, they develop both confidence and competence in discussing points of view and critiquing each other's work. Thus, we expect that peer emotional support will be positively associated with behavioral, emotional, and cognitive engagement (Hypothesis 1e).

1.3. Achievement motivation as a mediator between school environment and engagement

We draw on *expectancy-value theories* of motivation (Eccles, 2009) in predicting that students' motivational beliefs will mediate the association between perceived school characteristics and engagement. We assume that student motivation will be highest when the academic demands of school are a good fit for student expectations of success, educational values and goals, and individual developmental needs.

Academic self-concept. Self-concept of academic success refers to an individual's beliefs regarding their capacity to succeed on specific academic tasks (Eccles, 2009). There is growing evidence that positive perceptions of the school environment lead to students having higher levels of confidence in their academic self-concept (Vollmeyer & Rheinberg, 2000; Wigfield et al., 2006). Teachers who emphasize task structure and relevance foster both a positive sense of academic self-concept and positive school behaviors, whereas teachers who fail to provide clear structure and guidelines for students and who impose meaningless and uninteresting activities are in danger of hindering such positive developmental outcomes (Assor et al., 2002; Roeser et al., 1998). Similarly, when students feel that they are cared for and treated with respect by their teachers and peers, they are more likely to develop greater confidence in their academic abilities (Goodenow, 1993; Murdock & Miller, 2003). Furthermore, when students perceive classroom material as related to personal interests or goals, they feel more confident about mastering that material. In terms of provision of choice, it is not yet known whether providing students with decision-making opportunities regarding school governance and course material influences academic confidence. Finally, students' sense of academic self-concept influences how they behave, how they feel, and how they think—the three dimensions of engagement (Eccles, 2009), and indeed, student confidence in personal academic ability has been shown to predict level of school engagement and task involvement (Eccles & Wigfield, 2002; Schunk, 1996).

Subjective task value of school learning. Subjective task value is composed of beliefs regarding how enjoyable a task will be, how useful a task is for fulfilling short- and long-term goals, and how well a task meets personal needs and assists the realization of

personal identities (Eccles et al., 1993; Eccles & Wigfield, 2002). Several studies have shown that students' perceptions of their school environment predict the value that students attach to school. Students who experience emotional support and respect from teachers and peers are more likely to attach greater value to learning in school (Roeser et al., 1998). Similarly, when students feel that their teachers convey reasonable and clear expectations, provide appropriate instrumental help, and support their autonomy, they are more likely to value a task and experience positive feelings toward it (Assor et al., 2002; Grolnick, Ryan, & Deci, 1991). Furthermore, there is strong evidence that the subjective value a student places on a task influences the likelihood of his/her selection and participation in the task (Deci & Ryan, 2000; Updegraff, Eccles, Barber, & O'Brien, 1996). Research shows that motivation to do schoolwork that is based on interest or value is associated with various types of school engagement, including active behavioral participation, interest, and self-regulated learning (Connell, 1990; Elliot, McGregor, & Gable, 1999; Katz & Assor, 2006). Accordingly, we expect students who place high subjective task value on academic work at school will report higher levels of all three types of school engagement.

1.4. Moderation effects of gender, ethnicity, and academic ability

When either achievement patterns or perceived school environments are examined by gender, ethnicity, or academic ability, there are often significant group differences (Malecki & Demaray, 2003; Meece, Glienke, & Burg, 2006; Oates, 2009; Wang, 2009). For instance, overall, girls report higher levels of school engagement than boys regardless of what type of engagement is considered (Johnson, Crosnoe, & Elder, 2001; Martin, 2004). However, according to extant research, the significance of the role of group differences (e.g., gender and ethnicity) as a moderator of school effects on student engagement is unclear.

Little is known about the role that classroom management or instructional strategies may play in the development of gender differences in motivation and school engagement. As students make the transition to middle school, they perceive school as oriented toward teacher control and a social comparison-based approach to evaluating student ability (Urdan & Midgley, 2003). While these perceptions of school characteristics can inhibit the motivation and engagement of both genders in school, some studies suggest that girls do not respond as well to competitive teaching practices (Eccles, 2007). Recent studies show that girls and boys experience different levels of support from teachers and peers in school (Rueger, Malecki, & Demaray, 2010); thus, it is likely that teacher and peer support may have different effects on academic adjustment for each gender.

There is mixed evidence regarding ethnic differences when examining the relationship between school factors and academic outcomes; some studies suggest that African American students are less likely to engage in school than their European American counterparts (Downey & Ainsworth-Darnell, 2002), while other studies report no ethnic differences in the relationship between school climate and student academic adjustment (Harris, 2006; Smerdon, 1999; Wang & Huguley, 2012). Still other researchers have found that the impact of positive relationships with teachers is stronger for African American students than for European American students (Downey & Ainsworth-Darnell, 2002; Ferguson & Mehta, 2004).

The effect of school characteristics on student motivation and engagement may vary as a function of student academic abilities (Elliot et al., 1999; Pintrich, 2000). For instance, high performing students are more likely than low performing students to benefit from an autonomous learning environment, as provision of autonomy can reinforce a sense of competence, autonomy, and academic confidence amongst high performing students while increasing anxiety and a sense of helplessness amongst low performing students (Patrick, Skinner, & Connell, 1993). Low performing students may therefore require greater structure and support regarding academic achievement. This support may come from greater clarification of teacher expectations, consistency and predictability of response, and the employment of less complex teaching strategies (Skinner & Belmont, 1993). Yet few studies have examined the moderation effect of student academic ability when examining associations between school environment, motivation, and engagement. Including academic ability as a moderator will allow us to determine whether the level of student engagement in school is commensurate with demonstrated academic ability.

Taken together, it is evident that there is much to be gained by considering individual differences in gender, ethnicity, and academic ability when examining the relations among school characteristics, motivational beliefs, and school engagement. Greater understanding of these relations will enable researchers and educators to promote the specific contextual factors known to enhance student motivational beliefs and engagement in school among different types of students.

1.5. Research questions and hypotheses

Drawing on *self-determination theory*, *stage-environment fit theory*, and *expectancy-value theory*, we investigate how student perceptions of school characteristics predict school engagement when demographic characteristics and prior school engagement are controlled for. The three specific research questions of the study are to examine whether: (Research Question1) student perceptions of school environment are related differentially to the three dimensions of school engagement (i.e., behavioral, emotional, and cognitive engagement); (Research Question 2) students' motivational beliefs (academic self-concept and subjective task value) mediate the association between school environment and school engagement; and (Research Question 3) the strength of associations among school environment, motivation, and school engagement differ by gender, ethnicity, or academic ability.

For the first research question, we hypothesize that each aspect of school environment predicts the three types of school engagement differentially (Hypothesis 1). For the second research question, we hypothesize that student perceptions of the school environment directly and indirectly predict the level of school engagement through personal motivation beliefs (Hypothesis 2). Finally, in the absence of a strong empirical basis for making predictions about whether the associations between perceived school environment, motivational beliefs, and school engagement will function differently for boys or girls, for adolescents from different ethnic groups, or for adolescents with different academic abilities, we treat the gender, ethnicity, and academic ability moderation analyses as exploratory (Hypothesis 3).

2. Method

2.1. Participants

Study participants were part of the Maryland Adolescent Development in Context Study that was designed to increase understanding of the influences of social context on behavioral choices and developmental trajectories during adolescence. Participants were from twenty-three public middle schools in a large, ethnically diverse county near Washington D.C. of the United States. This study examines two waves of data: Wave 1($N = 1157$) collected in early fall of 7th grade and Wave 2 ($N = 1039$) collected

at the end of 8th grade. Of these respondents, approximately 56% are African American, 32% are European American, and 12% are either biracial or other ethnic minorities. Approximately 52% of the students are females. Both samples had a normally distributed range of socioeconomic levels, with the mean pre-tax family annual income between $45,000 and $49,999 (range: $5000 to >$75,000) and 86% of primary caregivers reported being employed.

The subsample was based on parent willingness to participate and on a stratified sampling procedure designed to capture proportional representation of families from each of twenty-three middle schools. Wave 2 retained approximately 89% of the original sample from Wave 1. The most common source of attrition was relocation outside of the school district. To examine whether sample attrition influenced results, we compared individuals with complete data or missing data at one wave with individuals with missing data at two or more waves on all indicators included in the analyses. None of the thirty-one comparisons were statistically significant.

2.2. Procedures

Seventh graders were recruited through letters to their families. Families interested in participating in the study were asked to sign and return a consent form. The investigators used a mixture of questionnaires and school records to collect the data. In this study we used data from the target student and the primary caregiver, who was most often the mother. Questionnaires with both students and their primary caregivers were conducted in the home during each wave of the study. Questionnaire administrators were primarily women with bachelor's degrees and their race was the same as that of the participating adolescent. The questionnaire took approximately thirty minutes to complete. Participating students were compensated $20 at each wave of data collection.

2.3. Measures

2.3.1. School engagement

We adapted existing well-established scales to assess the three dimensions of student engagement in school (e.g., Finn & Voelkl, 1993; Pintrich, 2000; Skinner & Wellborn, 1994). These scales have been shown to have strong psychometric properties, including internal consistency, convergent and divergent validity, and measurement invariance across gender, ethnicity, and socioeconomic status (see Wang, Willett, & Eccles, 2011). All measurements were scaled appropriately, so that high scores indicate higher levels of school engagement.

The Behavioral Engagement scale included five items and measured the extent to which students follow the school rules and participate in learning activities in school. Sample items are "How often do you get schoolwork done on time?" and "How often do you participate in class discussion actively?" Responses were based on a 5-point scale, ranging from 1 (*almost never*) to 5 (*almost always*).

The six-item scale of Emotional Engagement assessed students' feelings of acceptance, interest, and enjoyment with school. Sample items are "I find schoolwork interesting" and "I feel excited by the work in school." The item responses for the scale range from 1 (*strongly disagree*) to 5 (*strongly agree*).

The five-item scale of Cognitive Engagement measured the extent to which students use self-regulated learning strategies such as self-monitoring and evaluation to help understand learning materials. Sample items are "How often do you make academic plans for solving problems?" and "How often do you try to relate what you are studying to other things you know about?" Item responses of the scale range from 1 (*almost never*) to 5 (*almost always*).

2.3.2. School characteristics

The School Environment Measure was used to create five latent constructs to assess student perceptions of the school characteristics: (a) School Structure Support, (b) Provision of Choice, (c) Teaching for Relevance, (d) Teacher Emotional Support, and (e) Peer Emotional Support. Items for each scale were adapted from existing well-validated scales (e.g., Midgley et al., 1998; Roeser et al., 1998; Wigfield, Eccles, & Pintrich, 1996). Previous research has indicated that these scales have good psychometric properties, including internal consistency and predictive and criterion validity (Midgley et al., 1998). The School Structure Support subscale included four items and assessed teacher clarity of expectations, consistency and predictability of response, instrumental support, and adjustment of teaching strategies (e.g., "How often do you know what your teacher expects of you in school?"). The Provision of Choice subscale consisted of four items and assessed student opportunities to make decisions related to academic tasks and school governance (e.g., "How often do you get to choose your partners for group work?"). The Teaching for Relevance subscale included three items and assessed the extent to which the curriculum and instruction provide opportunities for self-exploration and offer activities that are relevant and related to student personal interests and goals (e.g., "How often do you discuss problems and issues that are meaningful to you?"). The Teacher Emotional Support subscale consisted of three items and assessed student perceived level of care and support from teachers (e.g., "How often can you depend on teachers to help you out when you have a personal or social problem at school?"). The Peer Emotional Support subscale included four items and assessed student perceived level of peer acceptance and positive relationships with peers (e.g., "How often can you depend on your friends to help you out when you have a social or personal problem at school?"). All items were rated on a five-point scale, ranging from 1 (*not very often*) to 5 (*very often*).

2.3.3. Achievement motivational beliefs

We used two measures adapted from the expectancy and value scales developed by Eccles et al. (1993) to assess student perceptions of achievement motivation. Both scales have been used in prior studies and demonstrated excellent convergent and discriminant validity (Anderman, Midgley, Wigfield, & Eccles, 2001; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). We created two latent constructs to represent student motivational beliefs in school: Academic Self-Concept and Subjective Task Valuing of School Learning, with each construct being represented by multiple items. The Academic Self-Concept scale included five items and assessed students' perceptions of their academic ability to learn or execute courses of action in order to attain educational performances (e.g., "How good are you in math?"). Items were rated on a seven-point scale, ranging from 1 (*not very good*) to 7 (*very good*). The Subjective Task Valuing of Learning in School scale included three items and measured students' intrinsic interest in and attainment valuing of academic achievement (e.g., "I go to school because I enjoy learning in school."). Items were rated on a seven-point scale in terms of importance, ranging from 1 (*not an important reason*) to 7 (*very important reason*).

2.3.4. Covariates

We controlled for a vector of important covariates related to student socioeconomic characteristics and prior academic achievement, motivation, and engagement, including gender (0 = female, 1 = male), ethnicity (two dummy variables: 0 = European American, 1 = African American; 0 = European American, 1 = others), socioeconomic status (parent education and family annual income), student prior school engagement, and academic achievement (GPA) in the early fall of 7th grade. We

standardized and added parent education and annual family income to create a composite measure of socioeconomic status. Student academic grade point average (GPA) was collected from school records. GPA was an average of student 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).

2.4. Data analyses

We used structural equation modeling (SEM) with Mplus 6.0 to fit the hypothesized relations among the study constructs (see Fig. 1). The nested nature of our data (students nested in twenty-three schools) was accounted for by fitting a multilevel model with random-effects, which produced correctly adjusted standard errors in the model estimations. We dealt with the missing data through full-information maximum likelihood estimation, which allowed us to include all available data and identified the parameter values that have the highest probability of producing the sample data (Baraldi & Enders, 2010).

To address the research questions, we began by fitting baseline models that assessed the direct effects of the five constructs of school environment on the three constructs of school engagement. After establishing these direct relationships, we introduced the two constructs of achievement motivation (academic self-concept and subjective task value) into the path model and tested their mediating effect on students' perceptions of school environment and school engagement. In order to test for mediation, we estimated indirect effects with delta method standard errors to confirm the mediation effects (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Finally, to examine the moderation effect of gender, ethnicity, and academic ability, we used a stepwise process for the multigroup comparisons in SEM recommended by Bollen (1989) and Kenny (2005) to examine whether the measurement and structural relations in the final model varied by gender, ethnicity, or student prior academic achievement level. We included a series of increasingly restrictive constraints on the model parameters and examined whether doing so led to a significant decrease in the model fit by using chi-square difference tests (Chen, 2007). If the impositions led to a significant decrease in overall model fit, it would indicate that there were differences across the groups in the pattern of associations.

3. Results

All bivariate correlations among latent variables were statistically significant and in the expected directions (see Table 1). All variables had low to moderate correlations (from .10 to .49), suggesting little multicollinearity (Kline, 2005). Confirmatory factor analysis (CFA) verified that the hypothesized constructs measure discrete, single latent variables. The standardized loadings ranged from .38 to .84 and were all statistically significant at the .05 level. For the assessment of the measurement model, all the latent variables, including five school factors, three school engagement factors, and two achievement motivation factors, were allowed to intercorrelate simultaneously. The measurement model was found to provide adequate fit, χ^2 (445, $N = 1157$) = 1116.87, $p < .001$, CFI = .97, TLI = .96, RMSEA = .02.

3.1. Direct effects of perceived school environment on school engagement

We present the standardized path coefficients for the final fitted model in Fig. 2. The overall model fit is good, χ^2 (352, $N = 1157$) = 984.32, $p < .001$, CFI = .95, TLI = .94, RMSEA = .04. The modification indices suggest no significant cross loadings. Student perceptions of School Structure, Provision of Choice, and Teacher and Peer Emotional Support were positively associated with Behavioral Engagement (γs = .30, .10, .18, and .12 respectively). Students who indicated positive experiences of School Structure, Provision of Choice, Teaching for Relevance, and Emotional Support from Teachers and Peers had higher Emotional Engagement (γs = .27, .18, .16, .21 and .22 respectively). Finally, Teaching for Relevance and Peer Emotional Support were positively associated with Cognitive Engagement (γs = .21 and .20 respectively). Teacher Emotional Support was not associated with Cognitive Engagement. Overall, the model accounts for 35% of the variance in Behavioral Engagement, 46% of the variance in Emotional Engagement, and 32% of the variance in Cognitive Engagement.

Table 1
Means, standard deviations, and intercorrelations among all latent variables ($N = 1157$).

Variable	1	2	3	4	5	6	7	8	9	10
1. School structure support	1.00									
2. Provision of choice	.36	1.00								
3. Teaching for relevance	.37	.31	1.00							
4. Teacher emotional support	.30	.29	.25	1.00						
5. Peer emotional support	.15	.21	.12	.36	1.00					
6. Behavioral engagement	.29	.19	.11	.21	.18	1.00				
7. Emotional engagement	.40	.23	.29	.24	.26	.32	1.00			
8. Cognitive engagement	.13	.13	.31	.20	.23	.23	.30	1.00		
9. Academic self-concept	.24	.13	.21	.18	.17	.28	.37	.38	1.00	
10. Subjective task value	.35	.18	.30	.32	.16	.24	.48	.34	.40	1.00
M	3.57	3.44	3.25	2.73	2.99	2.55	3.62	3.58	5.36	4.31
SD	0.85	0.77	0.98	0.92	0.85	0.52	0.60	0.54	1.01	1.45
Internal consistency (α)	.85	.77	.80	.70	.87	.72	.77	.81	.84	.77

Note. All coefficients are significant ($p < .01$).

3.2. Mediation effects of motivational beliefs

The mediation analyses examined the extent to which student Academic Self-Concept and Subjective Task Value of Learning mediated the relationships between perceived school environment and school engagement (see Fig. 3). The fit of this model is adequate, χ^2 (520, $N = 1157$) = 1417.30, $p < .001$, CFI = .95, TLI = .94, RMSEA = .04. Tables 2 and 3 present the results of direct, indirect, and total effects in the final model. The relations between School Structure and three of the engagement variables (Behavioral, Emotional, and Cognitive Engagement) were partially mediated by Academic Self-Concept and Subjective Task Value. Moreover, the relation between Teaching for Relevance and Emotional Engagement was fully mediated by the motivational variables, while the relation between Teaching for Relevance and Cognitive Engagement was partially mediated by the motivational variables. The relations between Teacher Emotional Support and both engagement variables (Behavioral and Emotional Engagement) were partially mediated by the motivational variables. Finally, the relation between Peer Emotional Support and Behavioral Engagement was fully mediated by the motivational variables, while the relations between Peer Emotional Support and Emotional and Cognitive Engagement were partially mediated by motivational variables.

The inclusion of the mediating variables adds 7%, 13%, and 10% to the explained variance in Behavioral, Emotional, and Cognitive Engagement, respectively. Overall, the variables explain 42%, 59%, and 42% of the variance in Behavioral, Emotional, and Cognitive Engagement, respectively. The school environment variables

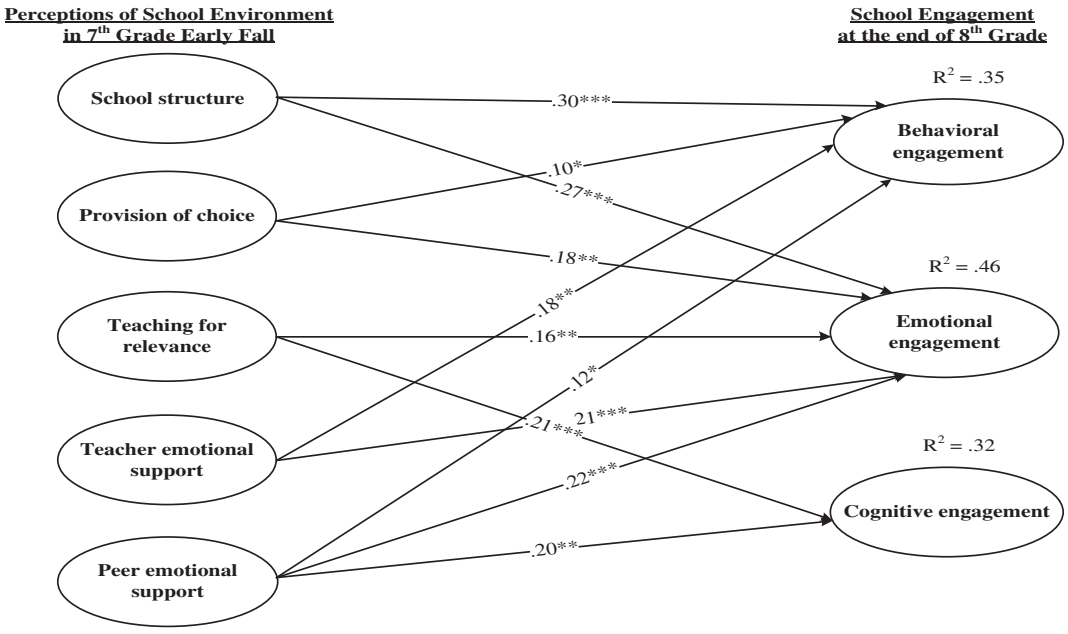

Fig. 2. Path model depicting direct effect of student perceptions of school environment on school engagement, controlling for prior school engagement, academic achievement, and demographic characteristics. Only statistically significant paths were presented in the model for clarity and all coefficients shown were standardized. Paths describing relations from controlling variables to outcome variables can be obtained in Table 2. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

account for 55% and 47% of the variance in Academic Self-Concept and Subjective Task Value, respectively.

3.3. Moderation effect of gender, ethnicity, and academic ability

We conducted three sets of moderation analyses to determine whether the measurement and structural relations in the final model varied by gender, ethnicity, or academic ability. For moderation analyses involving ethnicity, we examined differences across two groups: European American and African American students. For moderation analyses involving academic ability, we tested differences across two ability groups: high GPA and low GPA in the fall of 7th grade (we defined GPA scores above the median as high and below the median as low). The measurement part of the model was first tested by constraining the factor loadings of the two models to be equal. The $\Delta\chi^2$ difference test showed that model fit decrease is not significant across gender, ethnicity, or academic ability [gender: $\Delta\chi^2$ (23, $N = 1157$) = 34.67, $p = .13$; ethnicity: $\Delta\chi^2$ (23, $N = 1157$) = 33.24, $p = .21$; ability: $\Delta\chi^2$ (23, $N = 1157$) = 30.58, $p = .24$]. The constrained measurement model provides a good

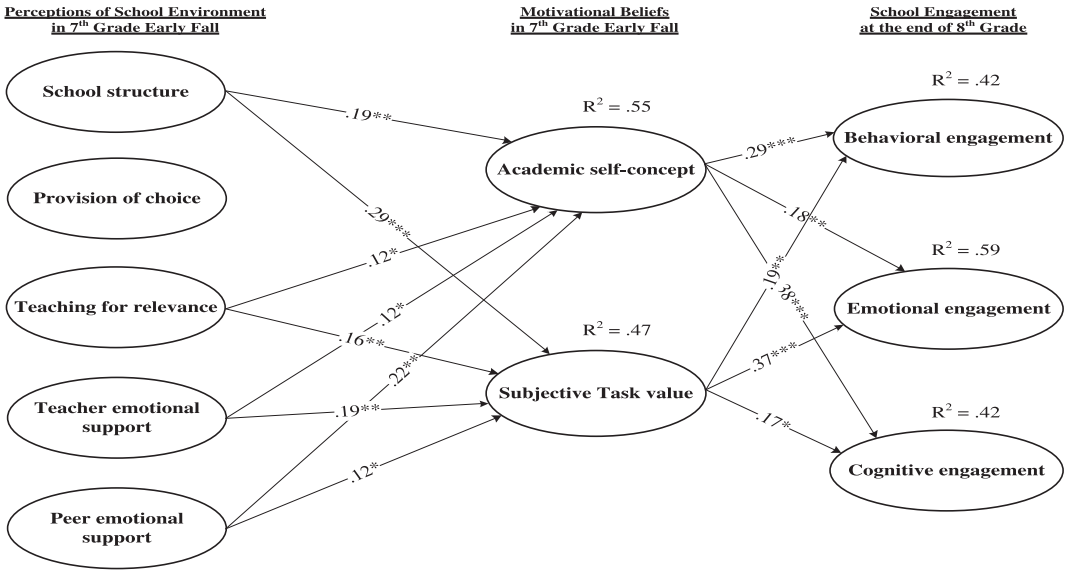

Fig. 3. Path model depicting mediational effect of motivational beliefs between perceptions of school environment and school engagement. Only statistically significant paths were presented in the model and all coefficients shown were standardized. Direct effects between school environment variables and engagement outcomes were not shown in the model for clarity but can be obtained in Table 2. Paths describing relations from controlling variables to mediating and outcome variables were presented in Table 3. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 2
Standardized direct, indirect, and total effects for the final model from perceived school environment and motivational beliefs to school engagement.

Predictor, mediator, and covariate	Behavioral engagement			Emotional engagement			Cognitive engagement		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Predictor variable									
School structure support	.17**	.13**	.30***	.15**	.14**	.29***	.06	.12**	.18**
Provision of choice	.07	.03	.10*	.11*	.04	.15*	.05	.04	.09
Teaching for relevance	.04	.05	.09	.01	.10**	.11*	.14*	.11**	.25***
Teacher emotional support	.10*	.10*	.20***	.12*	.08*	.20***	.05	.08	.13*
Peer emotional support	.04	.08*	.12*	.11*	.09*	.20***	.12*	.11**	.23**
Mediator variable									
Academic self-concept	.29***	–	–	.18**	–	–	.38***	–	–
Subjective task value	.19***	–	–	.37***	–	–	.16**	–	–
Covariate									
Male	−.11*	–	–	−.03	–	–	−.14*	–	–
African American	−.15**	–	–	.17**	–	–	−.07	–	–
SES	.20***	–	–	.05	–	–	.10*	–	–
Prior academic achievement	.38***	–	–	.11*	–	–	.12*	–	–
Prior behavioral engagement	.36***	–	–	.18**	–	–	.12**	–	–
Prior emotional engagement	.20***	–	–	.24***	–	–	.06	–	–
Prior cognitive engagement	.13*	–	–	.02	–	–	.38***	–	–

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

model fit overall for the three groups respectively. After examining measurement equivalence, the paths of the two models were constrained to be equal sequentially.

Moderation analyses by gender and ethnicity revealed no significant differences in the structural relations and suggest the generality of the overall model across females and males as well as European Americans and African Americans. For multigroup analyses involving academic ability, results indicated significant differences across groups in the relationships between perceived school environment and motivation as well as between perceived school environment and school engagement (see Table 4). Further analyses based on the full mediation model in Fig. 3 revealed that the academic ability differences were specific to the relationship between School Structure and Academic Self-Concept, $\Delta\chi^2\ (1) = 15.03$, $p < .001$, as well as Provision of Choice and Behavioral Engagement, $\Delta\chi^2\ (1) = 5.45$, $p < .05$. School Structure was more strongly associated with Academic Self-Concept for low achievers ($\beta = .24$, $p < .001$) than for high achievers ($\beta = .15$, $p < .01$). Conversely, for high achievers, increasing Provision of Choice was associated with greater Behavioral Engagement ($\beta = .16$, $p < .01$), while for low achievers increasing Provision of Choice was associated with lower Behavioral Engagement ($\beta = -.09$, $p < .05$).

Table 3
Standardized direct, indirect, and total effects for the final model from perceived school environment and covariates to motivational beliefs.

Predictor and covariate	Academic self-concept			Subjective task value		
	Direct	Indirect	Total	Direct	Indirect	Total
Predictor variable						
School structure support	.19**	–	–	.29***	–	–
Provision of choice	.07	–	–	.08	–	–
Teaching for relevance	.12**	–	–	.19**	–	–
Teacher emotional support	.12*	–	–	.16*	–	–
Peer emotional support	.22**	–	–	.12*	–	–
Covariate						
Male	−.11*	–	–	−.03	–	–
African American	−.15**	–	–	.06	–	–
SES	.21***	–	–	.17**	–	–
Prior academic achievement	.25***	–	–	.20***	–	–

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

4. Discussion

This study capitalizes on school engagement as a multidimensional construct—including behavioral, emotional, and cognitive engagement—and examines the influence of multiple school characteristics on all three types of engagement simultaneously. The findings provide empirical evidence regarding the malleability of school engagement and demonstrate that student perceptions of the school environment predict change in patterns of school engagement. For instance, when students experience school as optimal in structure, have opportunities to make choices, experience what they learn as having personal relevance, and feel emotionally supported in learning by both their teachers and peers, they are more likely to feel interested and to value learning activities in school. Finally, our study extends the past research on the application and integration of *self-determination theory*, *stage-environment fit theory*, and *expectancy-value theory* to illustrate the processes by which different features of the school environment influence student behavioral, emotional, and cognitive engagement in school.

4.1. Direct effects among school environment, achievement motivation, and engagement

The multifaceted nature of engagement captured in this study makes it possible to extricate the unique contribution of each school factor to the three different types of engagement. As we predicted, the associations between school characteristics and school engagement vary across the different types of engagement

Table 4
Moderation results: effects of academic ability on modeled relationships.

Constrained path	χ^2 (df)	p (for $\Delta\chi^2$)
1. Measurement model	1104.46 (512)	ns
2. School characteristics → motivational beliefs	**1145.32 (534)**	**.01**
School structure support → academic self-concept	**1156.78 (538)**	**.05**
3. School characteristics → school engagement	**1179.45 (550)**	**.05**
Provision of choice → behavioral engagement	**1072.31 (554)**	**.05**
4. Motivational beliefs → school engagement	1102.90 (581)	ns

Note. Bolded pathways denote differences across math ability groups.

(Hypothesis 1). For example, in order to increase behavioral engagement, modification of school structure or the enhancement of teacher–student relations appears to be more effective than fostering relevant academic tasks. It is critical to keep such distinctions of associations in mind when studying school engagement, as evidently, not all characteristics of school environment impact the unique types of school engagement in the same manner. The use of a multidimensional perspective allows us to gain a better understanding of which aspects of the school environment are most salient, and hence potentially most effective, in increasing the different types of school engagement.

As expected, students who report that their teachers provide clear expectations and consistent and contingent responses are more likely to participate in academic tasks and to identify in a positive way with their school (Hypothesis 1a). Similarly, greater interest and the use of self-regulatory strategies in learning are more common when the curriculum include meaningful topics that reflect students' personal goals and interests (Hypothesis 1c). Teaching for relevance also predicts higher academic self-concept and subjective task value. Contrary to our hypotheses, however, perceived provision of choice did not predict students' subjective task valuing of learning at school, nor did it predict their academic self-concept (Hypothesis 1b). There is evidence that the benefits of choice-provision for student motivation are likely to be limited if the choices involve tasks that are not deemed interesting or relevant to a student's personal goals and interests (Assor et al., 2002). Opportunities for decision making or freedom of action are less important than the extent to which the decision making and action opportunities available reflect personal goals, interests, and values (Deci & Ryan, 2000). It is possible that decision-making opportunities do not effectively support student autonomy in the case that no relevance to personal goals or interests is detected. In order to make choice and freedom of action motivational, students should be provided with options to engage in schoolwork that are relevant to personal goals and interests (Flowerday & Schraw, 2003; Katz & Assor, 2006). A beneficial strategy, for example, would be for teachers to explicitly illustrate and explain the relevance of tasks to the personal goals and interests of their students when providing them with choices.

4.2. Moderation effect of academic ability

It is plausible that some students have not developed the required academic ability to effectively harness the opportunities afforded to them when choices are made available. In the present study, the moderation effect of academic ability provides partial support for this assumption as provision of choice was found to positively predict the behavioral engagement of high performing students, but to negatively predict the behavioral engagement of lower performing students (Hypothesis 3). This moderating impact of academic achievement on the link between provision of choice and behavioral engagement suggests that greater behavioral engagement is more likely to occur in a school environment that responds to differing levels of academic ability with the developmentally appropriate provision of autonomy (Deci & Ryan, 1985; Patrick et al., 1993). A second moderation effect of academic ability supplements this finding: the positive effect of school structure on academic self-concept is stronger for low achievers. According to *self-determination theory*-based studies (see Deci & Ryan, 2000; Skinner & Belmont, 1993), teachers who balance structural support and student autonomy in an effort to maintain an engaging environment are more likely to encounter increased learning motivation in their students. For choice to have beneficial effects, it needs to be tailored to student academic ability. Taken together, choice can be motivational when the task choice options are of appropriate difficulty and when it comes with adequate structure support. It is important for teachers who provide choice to match the complexity of the tasks to student academic abilities and perceived competence. Teaching is most effective when directed toward the student's zone of proximal development, which is largely determined by their academic skills.

In regard to support for relatedness, we found that students are more likely to behaviorally and emotionally engaged in school when teachers and peers create a caring and socially supportive environment (Hypotheses 1d and e; Battistich et al., 1997; Wentzel, 2003). The findings add to growing evidence that student perceptions of the nature and quality of the school social environment are as important as the academic environment (e.g., academic tasks and instructional practices) in promoting adaptive achievement motivation and engagement in school (e.g., Turner, Meyer, Midgley, & Patrick, 2003). If focus is placed solely on academic activity, a teacher runs the risk of creating a negative social environment wherein students are less likely to become behaviorally and emotionally engaged, and are more likely to be apprehensive about making mistakes. Accordingly, if focus is placed on the social dimensions of class only while academic dimensions are neglected, students are less inclined to become behaviorally and cognitively engaged in learning.

4.3. Mediation effect of achievement motivation

This study identifies the role that motivational beliefs play in mediating the relationship between school environment and various dimensions of school engagement, demonstrating that student perceptions of the school environment directly and indirectly predict the level of school engagement through personal motivation beliefs (Hypothesis 2). Consistent with our expectations, an academically adaptive and socially oriented school environment that facilitates person-environment fit promotes student engagement through its influence on student academic self-concept and subjective task values. In particular, student academic self-concept and subjective task valuing of learning is enhanced when the school environment provides clarity of expectation, consistency and predictability of response, emotional support, opportunity to learn and master meaningful material, and sufficient or appropriate support of students' personal goals and interests. This study informs the understanding of the mechanisms by which the school environment influences student engagement, thus highlighting critical points of intervention.

Understanding student engagement in school requires an integrative motivational framework that considers the interaction of the psychological and contextual factors in a youth's life, as well as the developmental needs of the youth as he or she matures within these contexts. Most studies of school engagement and achievement in motivational psychology focus on a single theoretical framework rather than taking advantage of the area's rich theoretical landscape. The phenomenon of looking for lost keys under the lamppost rather than in all the other places they might be epitomizes this focused, but deficient approach. Through the implementation of multiple motivational theories (*self-determination theory*, *stage-environment fit theory*, and *expectancy-value theory*) in the design of this research and in the interpretation of the results, this study provides a much richer picture of the role of school engagement in adolescent development.

4.4. Limitations, future research, and implications for practice

Researchers have typically used student self-reports of school characteristics in order to comprehend how students themselves

derive meaning from their own *perceptions* of the school learning environment. In fact, a growing number of studies have shown that student perceptions of school experiences are critical components in understanding their developmental outcomes (e.g., Wang & Holcombe, 2010). However, relying on student self-reports in assessing perception of school context raises an important validity concern, which is that students could answer questions about their behavior or that of their teacher in ways that they perceive to be socially desirable. Future inclusion of multiple sources of information (teachers, principals, parents), as well as multiple methodologies (interviews, observations, surveys), will provide a more robust, valid method of identifying school effects related to engagement. Furthermore, research from our motivational frameworks presumes a causal sequence that the perceived school environment contributes to individual motivational beliefs. However, it also has been suggested that the extent to which students are motivated in school may also influence their responses to the school environment (Urdan & Midgley, 2003). It is possible that students with high academic self-concept and particularly high task value are more likely to attend to and appreciate teachers' reference to relevance. Thus, future research should examine the prospective reciprocal relations between school environment and adolescent motivational beliefs. Additionally, in this study we examined the impact of school context on student engagement in school; a more comprehensive examination would take into account other contexts such as family and neighborhood. Finally, school engagement is likely to take different forms in the elementary and secondary school years (Fredricks et al., 2004). Future comparison of longitudinal studies across different age ranges would be of use in the clarification of whether the findings identified in this study were unique to this sample at this given time, or whether the findings in fact represent an otherwise generalizable or even universal developmental trajectory for school engagement. Greater precision in the articulation of the developmental effects of school engagement will help to inform interventions to support adolescent learning at different levels of schooling.

The study of school engagement as a multidimensional construct and as an interaction between the individual and the school environment enabled us to identify which particular school characteristics foster or undermine student engagement and to achieve a greater understanding of the psychological mechanisms through which the school environment influences student engagement in school. The current study suggests that teachers have a critical role to play in creating a positive school environment, which can in turn help them to optimize their students' perceptions of their school environment. The five aspects of school environment examined in this study are influenced by the academic goals and social climate emphasized and fostered by teachers in their implementation of school policies, selection of instructional practices and academic tasks, organization of the classroom environment, and the manner in which they relate to their students. Teachers can promote student learning motivation and engagement by creating a supportive school environment that stresses and provides opportunities for students to feel competent, autonomous, and emotionally supported (Alfi, Assor, & Katz, 2004; Reeve, Jang, Carrell, Jeon, & Barch, 2004). Such school environments enable all students to succeed in the required academic and social tasks at hand and to grasp the role that schoolwork has to play in the realization of their personal goals, interests, and values. The present study thus supports the notion that attending to the quality of both academic and social domains of the school environment is important in developing a positive student perception of school, which in turn promotes student motivation and engagement. With a thorough understanding of how school characteristics affect student behavioral, emotional, and cognitive orientation, schools will be more able to establish practices that prevent disengagement and to foster learning environments that support engagement – resulting in the mutually beneficial outcome of enhanced academic performance.

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