

*The Influence of Noncognitive
Domains on Academic
Achievement in K-12*

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November 2009

ETS RR-09-34



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Abstract

This paper identifies three noncognitive domains relevant for academic achievement in K-12— student engagement, behavioral learning strategies, and school climate. The paper also documents empirical findings that show relationships between these three noncognitive domains and academic achievement, especially in the areas of reading and mathematics.

Key words: K-12, noncognitive, academic achievement, reading, mathematics

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Research into the identification of ways to enhance student academic achievement has suggested that some focus should be paid on *noncognitive* domains. Although policymakers have tended to oppose allocation of classroom time to improving student noncognitive skills such as self-efficacy and collaboration, the research evidence has continued to encourage some researchers to direct their attention to understanding the impacts of noncognitive attributes on student success, and there is current evidence to suggest that noncognitive and cognitive abilities have the potential to mutually reinforce each other to maximize student learning (Rothstein, 2004).

This paper identifies noncognitive variables that have been found particularly relevant to K-12 students' achievement in reading and mathematics, and reviews the specific research evidence pertaining to the relationships between certain noncognitive variables and these academic outcomes. Our focus is on K-12 student populations as a whole and does not include studies limited to subgroups defined by such characteristics as race/ethnicity, learning or physical disabilities, or degree of English language proficiency.

What Are Noncognitive Variables?

The term *noncognitive* has been used in economics and sociology more widely than in psychology and education, and it is used quite broadly, "as a catch-all ... to focus on variables other than those measured by test scores" (Farkas, 2003, p. 542). In other words, traits, behaviors, and skills that are *not* measured in traditional cognitive tests may be considered noncognitive variables. A general distinction between cognitive and noncognitive variables can be found in the manner in which they are assessed. That is, cognitive abilities are usually measured by objective tests, while noncognitive traits and skills are often assessed through some form of rating system using surveys or observations, reported either by respondents themselves or by others who can judge the qualities of the person being assessed.

Cognitive tests are assessments of cognitive abilities. Examples of such tests include (a) IQ tests like the Stanford-Binet or Raven's Progressive Matrices; (b) ability tests measuring, for instance, spatial ability, or information-processing speed; and (c) subject-matter tests, such as reading or mathematics tests (Farkas, 2003; Messick, 1979). Noncognitive traits and skills relevant to academic achievement typically include (a) variables such as attitude, values, interest, and curiosity; (b) personality or temperament variables, such as conscientiousness and extraversion; (c) social relations variables including leadership, social sensitivity, and the ability to work with others; (d) self constructs such as self-efficacy and personal identities; (e) work

habits such as effort, discipline, persistence, and time management; and (f) emotions toward a specific task, such as enthusiasm and anxiety (Farkas, 2003; Messick, 1979). In education, the background questionnaire for National Assessment for Educational Progress (NAEP; National Assessment Governing Board, 2003) is one example of where the term noncognitive is used in education in a way similar to how sociologists use the term. That is, educational researchers and policy makers involved with NAEP have defined noncognitive data as “*all of the information beyond the academic assessment.*” It has been noted, however, that the term noncognitive is “less readily understandable” compared to other terms such as background information (National Assessment Governing Board, 2003, p. 10).

There have been attempts to propose a comprehensive noncognitive model in the educational research literature. For example, Sedlacek and Brooks (1976) and Sedlacek (2003, 2005) presented a noncognitive model consisting of a number of components relevant for college students’ success (e.g., positive self-concept, realistic self-appraisal, preference for long-term goals, and community involvement). Their research formed the basis for Powell and Arriola’s (2003) noncognitive model developed for African American high school students. Additional research using noncognitive domains has been conducted in relation to graduate students (Kyllonen, Walters, & Kaufman, 2005) and athletes (Hyatt, 2003). However, we have been unable to locate any educational research that specifically proposes a comprehensive noncognitive model for students in grades K-12.

On a broader level, Messick’s (1979) review paper, “Potential Uses of Noncognitive Measurement in Education,” is perhaps the only document that includes noncognitive variables relevant for *all* educational levels. He argued for 12 noncognitive variables as potentially useful measures in terms of educational relevance. These variables included background information, affect, attitudes, beliefs, interests, motivation, curiosity, temperament, social sensitivity, coping strategies, cognitive styles, creativity, and values. Messick suggested that these noncognitive variables may be used to enhance educational opportunities, objectives and standards, guidance, selection, placement, instruction, learning, and evaluation. Moreover, he identified the variables that would be useful at different educational levels: pre-K and elementary, secondary, and higher education; professional and graduate school; and continuing and career education.

Noncognitive and cognitive components coexist within some of the aforementioned traits and behaviors, and it is difficult to disentangle the two. Messick (1979) contended that we cannot

draw a clear distinction between cognitive and noncognitive variables because it is a matter of relative *balance* between the two sets of variables. He noted that “cognitive does not imply only cognitive and noncognitive does not imply the absence of cognition,” and that furthermore, “the cognitive, affective, and other subsystems of personality have differentiable properties, to be sure, but they are manifold and complex and intricately intertwined” (p. 282).

The Importance of Noncognitive Variables in Student Learning

Sociologists and economists have long argued that a well-developed set of noncognitive traits and skills would have a more durable impact than academic subject knowledge on a person’s school and job performance. First, they note that noncognitive traits and skills, such as attendance, punctuality, organizational skills, and working with others, are what teachers desire in their students as well as what employers look for in potential employees (Bowles & Gintis, 1976). In other words, many of the characteristics that teachers and employers consider important are essentially the same. Second, they argue that biological and socioeconomic status (SES) measures exert stronger influences on cognitive abilities than on noncognitive traits and skills (Bowles & Gintis, 1976). This implies that the benefit(s) of assessing and enhancing noncognitive variables can be greater for lower-income than higher-income students. That is, researchers have failed to explain causes of the achievement gap (prominent between higher- and lower-income students) solely by genetic or family factors, and consequently have turned to psychological, social, and emotional factors as possible explanatory variables (Powell & Arriola, 2003). Finally, advocates of assessing noncognitive attributes argue that these variables *are* susceptible to change--from the environment, experiences, and social interactions. Given this belief that noncognitive rather than cognitive attributes are the more prominent determinant of success at both school and work (Bowles & Gintis, 1976, 2002; Farkas, 2003), these researchers concluded that, “... most of the effect of schooling on occupational and earnings attainment is due, not to the effect of schooling on cognitive skills as measured by test scores, but to the correlation between schooling and various noncognitive traits” (Farkas, 2003, p. 547).

Selection Criteria in This Review

Our main focus in this paper is to document the associations and/or effects of noncognitive variables on school age children’s academic achievement in reading and mathematics. Thus, the general areas in the research literature in which we searched were related

to noncognitive variables as well as K-12 reading and/or mathematics achievement. We used several databases to locate relevant studies: Educational Resources Information Center (ERIC), Education Research Complete, PsycINFO, and PsycARTICLES. We selected studies published in peer-reviewed journals or books/book chapters and excluded conference papers, evaluation reports, or working papers. We included only studies conducted in the United States that targeted a general population of students (e.g., students at certain grades), as opposed to a particular subgroup of students (e.g., students in urban areas, students with learning or physical disabilities, English language learners, immigrant students, or students identified as being at risk for school failure).

Some studies reported in the literature that have examined particular aspects of noncognitive variables may not have explicitly employed the term “noncognitive.” Consequently, additional search terms we used to locate relevant studies included attitude, affect, anxiety, belief, basic skills, bonding with school, classroom behaviors, cooperation, curiosity, discipline, effort, emotion, engagement, extracurricular activity, habit, help seeking, homework, independence, interest, leadership, learning strategies, learning style, liking, metacognition, motivation, noncognitive, note-taking, organizational skills, parents, parental involvement, peer, perseverance, persistence, school climate, school leadership, school organization, sense of belonging, self-confidence, self-concept, self-control, self-discipline, self-efficacy, self-regulation, social competence, social context, social relation, study habits, teacher support, teacher relation, teamwork, test anxiety, test-taking skills, test-taking strategies, thinking skills, time management, time spent on tasks, and values.

The terms *academic* or *school* were used in combination with these noncognitive-related terms to find only the studies that examined relationships between noncognitive variables and academic achievement, especially relative to reading or mathematics. Furthermore, we sought studies that employed direct measures of reading and mathematics achievement, such as standardized tests, teachers’ ratings, and course or semester grades. Studies where the outcome measures were *not* academic achievement were excluded from this review. Examples of excluded studies are those that used outcome measures such as problem solving skills, classroom behaviors (e.g., disruptive conduct), motivational outcomes, and psychological symptoms (e.g., a sense of belonging). Although we located thousands of studies examining some aspect of the noncognitive variables listed above, the number decreased considerably when we limited our

search to studies that examined the relationships of noncognitive variables to K-12 reading and/or mathematics achievement.

One other criterion we employed to locate relevant studies involved a demonstration of moderate-to-strong effect sizes. To evaluate effect size, we followed Cohen's (1992) operational definitions of medium effect sizes: (a) significant, product-moment correlations greater than .30, (b) multiple partial correlations drawn from regression models greater than .15, (c) a significant direct link with standardized path coefficients greater than .25 in path or structural equation models, and (d) *d*-indexes greater than 0.50 in comparing independent means in meta-analytic studies. This also means that only those quantitative studies that actually reported the strength of relationships among noncognitive variables and academic achievement were eligible to be part of this review.

Categorizing Noncognitive Variables

Although thousands of noncognitive studies have been reported in the literature, only about 100 met *all* of our criteria described above (i.e., studies that demonstrated strong empirical links between noncognitive variables and reading or mathematics achievement and were conducted in the United States on a sample of school-age students). Each of the noncognitive domains and its sub-constructs will be described in more detail in subsequent sections.

In short, three major noncognitive domains appear to emerge as most relevant to K-12 academic achievement: (a) *student engagement* (e.g., Finn, Pannozzo, & Voelkl, 1995; Finn & Rock, 1997; Fredricks, Blumenfeld, & Paris, 2004; Fredricks & Eccles, 2006; Martin & Dowson, 2009; Patrick, Ryan, & Kaplan, 2007); (b) *behavioral learning strategies* (e.g., Broekkamp, Van Hout, & Bernadette, 2007; Hattie, Biggs, & Purdie, 1996; Pintrich & De Groot, 1990; Vermunt & Vermette, 2004); and (c) *school climate* (e.g., Fan & Chen, 2001; Goddard, Logerfo, & Hoy, 2004; Hill & Craft, 2003; Hoy, Sweetland, & Smith, 2002; Pianta, La Paro, Payne, Cox, & Bradley, 2002). Table 1 presents a summary of the constructs of interest.

Student engagement refers to students' behavioral, emotional, and cognitive involvement in and with their learning activities. Variables such as values, self-related constructs, work habits, motivation, and feelings generally fall under this student engagement construct (Fredricks et al., 2004; Fredricks & Eccles, 2006; Lutz, Guthrie, & Davis, 2006; Martin & Dowson, 2009). With regard to learning strategies, we focused on behavioral aspects, and thus cognitive and metacognitive learning strategies are not discussed here. Behavioral learning strategies refer to

habitual activities or skills that students use during learning to manage and control (a) their own behavior (e.g., through effort or habit), (b) the behavior of others (e.g., through seeking help), and (c) resources (e.g., places to study; e.g., Pintrich, 2000; Pokay & Blumenfeld, 1990). More specific behavioral strategies include effort management (e.g., Onatsu-Arvilommi, Nurmi, & Aunola, 2002), help-seeking activities (e.g., Newman & Schwager, 1995), homework management (e.g., Cooper, Robinson, & Patall, 2006; Xu & Corno, 2003), time management (e.g., Britton & Tesser, 1991; Claessens, van Eerde, Rutte, & Roe, 2007), and note-taking skills (e.g., Kobayashi, 2005, 2006). Finally, school climate refers to the organizational characteristics of a school that influence behaviors, attitudes, and values of school community members which can include teachers, peers, parents, and school administrators (Hoy & Hannum 1997; Hoy & Miskel, 1996; Tagiuri & Litwin, 1968). In summary, to achieve academic success, students should be engaged with learning, be able to apply basic learning strategies to grasp the learning material, and be surrounded by positive social-environmental influences that are generated by or obtained from school, peers, and their parents.

From student engagement to behavioral learning strategies to school climate, we see the locus of control shifting from inside influences to outside influences. That is, most of the student engagement variables reside within students' minds, and while schools can teach students about particular learning strategies, it is students themselves who ultimately decide to employ (or not) the instructed or learned strategies. Finally, school climate variables are invariably imposed from the outside in.

These three broad categories of constructs--student engagement, behavioral learning strategies, and school climate--appear to encompass most noncognitive variables related to K-12 student learning. Furthermore, dividing noncognitive variables into these three categories suggests that there may be distinct interventions for each domain. These three categories of noncognitive variables can also be found in recent large-scale assessments, such as (a) the Education Longitudinal Study (ELS) 2002 (National Center for Education Statistics [NCES], 2004), (b) the Program for International Student Assessment (PISA) 2003 (Organization for Economic Co-operation and Development [OECD], 2004), and (c) Trends in International Mathematics and Science Studies (TIMSS) 2003 (Mullis et al., 2003).

Table 1***Noncognitive Domains in K-12 Academic Achievement***

Student engagement	
Behavioral engagement	Attending classes, following rules, concentrating on assignments, asking questions, participating in school activities
Cognitive-motivational engagement	Preference for challenge, intrinsic motivation, values, investment in learning, attribution for success, academic self-beliefs
Emotional engagement	Interest, curiosity, sense of belonging, and affective states or feelings (e.g., bored, anxious, proud, and shamed)
Learning strategies	
Time management	Behaviors directed toward effective use of time to maximize productivity and meet the goals for a particular task
Test-taking strategies	Control of one's cognitive functioning and regulating motivation, confidence, and effort levels before and during test-taking situations
Effort management	Ability to control effort and to avoid or reduce distractions
Help-seeking	Behaviors directed toward getting help for learning
Homework management	Ability to monitor motivation and emotion and to complete homework assigned by teachers
Note-taking strategies	Ability to concentrate during lecture and to coordinate multiple cognitive functions such as writing, listening, and reading
School climate	
Academic emphasis	Expectations for students and students' positive reactions
Teacher variables	Collective efficacy, teacher empowerment, sense of affiliation
Principal leadership	Collegiality, setting high morale, and clearly conveying goals
Social-environmental variables	Parental involvement, perceived peer norms

In the remainder of this paper we first define each of the three noncognitive domains (student engagement, behavioral learning strategies, and school climate), including the sub-constructs underlying each domain. Next, we examine specific relationships among our noncognitive domains and academic achievement, focusing mainly on reading and mathematics achievement. Finally, we conclude with ideas for future research in the area.

Noncognitive Variables and K-12 Academic Achievement

Student Engagement

Fredricks et al. (2004) provided a conceptual framework to define student engagement consisting of three major types: behavioral, cognitive, and emotional. Although some researchers have explored other types of engagement such as academic engagement (Finn & Pannozzo, 2004) or social engagement (Lutz et al., 2006), student engagement viewed from behavioral, cognitive, and emotional perspectives appears to be the most widely accepted (cf., Guthrie & Wigfield, 2000; Lutz et al., 2006). Furthermore, most (if not all) of the variables that typically fall under student engagement (e.g., class participation or motivation) can be classified into one of the three engagement types.

In Fredricks et al.'s (2004) framework, student engagement was loosely defined as commitment or involvement, and they noted that the term "student engagement" encompasses how students think, feel, and behave. This broad collection of attributes could potentially obscure important issues relating to student engagement (Fredricks et al., 2004, p. 60), and that motivated them to focus on just three types of student engagement, each one described in turn.

Behavioral engagement. Behavioral engagement refers to students' external behaviors indicative of their interest and investment in learning activities. These behaviors can be observed by others in the classroom, and as part of various school or learning activities (Finn & Pannozzo, 2004; Fredricks et al., 2004). Specific types of such observable behaviors include: following school rules, arriving at school on time, not skipping classes, turning in homework on time,¹ and avoiding fights (Finn 1993; Finn et al., 1995; Finn & Rock, 1997; Fredricks et al., 2004). Less easily observed behaviors include working hard for good grades, paying attention in class, seeking information on one's own, and attempting to surmount difficulties (Connell & Wellborn, 1991; Fincham, Hokoda, & Sanders, 1989; Finn & Cox, 1992; Finn & Rock, 1997; Fredricks et al., 2004; Skinner, Wellborn, & Connell, 1990). Behaviors that are believed to be indicators of the highest level of engagement include students' initiating discussions with teachers and other students on the materials that they learn in school, participating in school governance, joining the school's extracurricular activities such as book clubs, and taking part in learning activities outside of school (Finn, 1993; Finn et al., 1995; Fredricks & Eccles, 2006).

Cognitive-motivational engagement. Cognitive-motivational engagement involves students' decisions, beliefs, motivation, and willingness to expand their efforts to learn and

overcome challenging situations (Bandura, 1997; Connell & Wellborn, 1991; Fredricks et al. 2004). Cognitive-motivational engagement is demonstrated, for example, by a student's decision to put extra effort into his/her school work, and the internal and external articulation of personal beliefs and expectations with regard to school achievement. Additionally, cognitive-motivational engagement may be characterized by students showing a preference for challenging work, persisting in the face of failure, and having a more internal focus toward learning beyond the desire to just attain good grades (Bandura, 1997; Connell & Wellborn, 1991; Deci & Ryan, 1992; Dweck, 1986; Fredricks et al. 2004; Newmann, Wehlage, & Lamborn, 1992; Patrick et al., 2007). Key cognitive-motivational engagement constructs that are particularly relevant for students' academic achievement include: self-concept (Carr, Borkowski, & Maxwell, 1991; Pokay & Blumenfeld, 1990), self-efficacy (Bandura, 1997; Chen & Zimmerman, 2007; Eshel & Kohavi, 2003; Pintrich & De Groot, 1990; Pokay & Blumenfeld, 1990; Schunk, 1991; Zimmerman & Martinez-Pons, 1990), self-discipline (Bembenutty, 2000; Duckworth & Seligman, 2005; McCann & Turner, 2004; Wolters 1999), and attribution for success/failure (Borkowski, Weyhing, & Carr, 1988; Carr et al., 1991).

Emotional engagement. Emotional engagement refers to a student's affective reactions and feelings toward learning in general, as well as toward school, teachers, and classmates (Alexander, Entwisle, & Dauber, 1993; Connell & Wellborn, 1991, 1994; Fredricks et al., 2004). Students can express their emotional engagement by their interest, boredom, happiness, enthusiasm, curiosity, and anxiety in response to school and learning in general (Alexander et al., 1993; Connell & Wellborn, 1991; Fincham et al., 1989; Fredricks et al., 2004; Lee & Smith, 1995; Skinner & Belmont, 1993; Stipek, 2002). Feeling proud of one's academic accomplishments, as well as a sense of belonging or identification with the school, are also considered important indicators of emotional engagement (Finn, 1989; Voelkl, 1997). Table 1 presents a summary of constructs for behavioral, cognitive, and emotional engagement.

Learning Strategies

Hattie et al. (1996) conducted a meta-analysis study on learning strategies, which included over 50 learning-strategy interventions. Their research indicated that the most commonly employed interventions focused on students' memory, organizational skills, motivation, attributions for success, and task-specific strategies such as elaboration and translation. Expected outcomes of learning-strategy interventions mainly involved improved

school performance, although some interventions targeted increased positive emotions toward school and learning in general.

Different taxonomies of learning strategies have been emerging over the past couple of decades. They have been sub-divided into (a) cognitive, metacognitive, and resource management strategies (Pokay & Blumenfeld, 1990); (b) cognitive, metacognitive, and motivational skills (Mayer, 1998); and (c) cognitive regulation and volitional control (Pintrich & De Groot, 1990). It appears that four main categories--cognitive, metacognitive, motivational, and behavioral strategies--can encompass the variables commonly included as learning strategies. Under the heading of cognitive strategies, activities that are particularly relevant for students' academic outcomes in K–12 settings include (a) review of material (Hong, Sas, & Sas, 2006); (b) rehearsal of information and procedures (Eshel & Kohavi, 2003; Pintrich & De Groot, 1990; Wolters, 1999); (c) organization of new knowledge and skills (Eshel & Kohavi, 2003); and (d) elaboration/translation of new content (Pintrich & De Groot, 1990; Pokay & Blumenfeld, 1990). Metacognitive strategies found to be useful across subject areas and grade levels include (a) knowing one's mental processes (Cardelle-Elawar, 1992; Pintrich, 2002; Pokay & Blumenfeld, 1990); (b) planning objectives and monitoring progress (Cardelle-Elawar 1992; Carr et al., 1991; Pintrich & De Groot, 1990; Pokay & Blumenfeld, 1990; Weinstein, Schulte, & Palmer, 1987; Wolters, 1999; Zimmerman & Martinez-Pons, 1986); (c) regulating cognitive strategies (Cardelle-Elawar 1992; Carr et al., 1991; Wolters 1999); (d) integrating new pieces of information into coherent knowledge representations (Cardelle-Elawar 1992); and (e) evaluating learning progress and skills (Carr et al., 1991; Hong et al., 2006; Pokay & Blumenfeld, 1990). Because our focus is on noncognitive domains, we will not discuss cognitive and metacognitive learning strategies and will focus only on behavioral learning strategies in this paper.

Behavioral learning strategies refer to habitual activities that students employ during learning to manage and control their own behavior, the behavior of others (e.g., through seeking help), and resources (e.g., places to study) (Pintrich, 2000; Pokay & Blumenfeld, 1990). Specific behavioral strategies that have been linked to K-12 students' academic achievement include (a) time management (Britton & Tesser, 1991; Claessens et al., 2007; Cooper, Jackson, Nye, & Lindsay, 2001; Hong et al., 2006; Smith 1992); (b) test-taking strategies (e.g., Cohen, 2006; Hancock 2001; Hong et al., 2006; Pintrich & De Groot, 1990; Samson 1985; Scruggs, White, & Bennion, 1986); (c) effort management (Onatsu-Arvilommi et al., 2002; Pintrich & De Groot,

1990; Pokay & Blumenfeld, 1990; Stipek & Gralinski, 1996; Wolters 1999; Zimmerman & Martinez-Pons, 1986); (d) help-seeking (Cooper et al., 2001; Hong et al., 2006; Nelson-Le Gall 1985; Nelson-Le Gall & Gumerman, 1984; Newman 1990; Newman & Goldin, 1990; Newman & Schwager, 1995; Schunk & Zimmerman, 1994); (e) homework management (Bempechat, 2004; Cool & Keith, 1991; Cooper, 1989, 2001; Cooper, Lindsay, Nye, & Greathouse, 1998, Cooper et al., 2001, 2006; Keith & Cool, 1992; Keith, Reimers, & Fehrmann, 1986; Keith et al., 1993; Keith, Diamond-Hallam, & Goldenring-Fine, 2004; Xu & Corno, 2003); and (f) note-taking skills (Faber, Morris, & Lieberman, 2000; Hong et al., 2006; Kobayashi, 2005, 2006; Peeverly et al., 2007).

Time management. The literature defines time management as behaviors directed toward effective use of time to maximize productivity and to meet the goals for a particular task (Britton & Tesser, 1991; Claessens et al., 2007; Woolfolk & Woolfolk, 1986). Time management includes the major components of assessing, planning, and monitoring time and tasks at hand (Claessens et al., 2007). For school-aged children, their use of time after school has been examined in terms of the following categories: time spent on homework, on chores, with parents, or with friends, time watching television, time listening to music, and time engaging in leisure reading, among others (Posner & Vandell, 1999; Smith, 1992).

Test-taking strategies. Hong et al. (2006) proposed a taxonomy of test-taking strategies consisting of three major components: (a) test-preparation strategies, (b) test-preparation awareness, and (c) actual test-taking strategies. *Test-preparation strategies* involve the control of one's cognitive functioning (e.g., memorizing, reasoning, and note-taking), managing the work environment (e.g., time management and help-seeking), and regulating one's own motivation, confidence, and effort levels. *Test-preparation awareness* includes knowledge of one's own study habits, past achievements, and personal beliefs, as well as the ability to recognize one's anxiety and motivational problems that may arise during tests. Actual *test-taking strategies* relate to remembering the material covered in class or textbooks, checking answers for mistakes, identifying and eliminating wrong answers, using memory aids, identifying item difficulty, and assessing and allocating testing time.

Effort management. Effort management is described in the literature as students' ability to control their effort and avoid and reduce distractions when studying. It is measured by items

such as “I sometimes delay starting to do my exercises,” “If the exercise is difficult, I often leave it unfinished,” and “Difficult exercises make me give up” (Onatsu-Arvilommi et al., 2002).

Help-seeking. Students’ help-seeking behaviors used to be viewed as signs of weakness related to lack of motivation, incompetence, immaturity, or over-dependence on others. However, researchers in the 1990s began to view help-seeking as an indication of students’ desire and attempt to learn the best way they can. In particular, they point out that students are more likely to seek help when they are metacognitively aware regarding a given task (i.e., they know what they know and what they can and cannot do). Thus seeking help from teachers, parents, and peers is no longer seen as a negative behavior, but rather as part of positive learning processes (Newman & Schwager, 1995).

Homework management. Homework may be defined as “any task assigned by schoolteachers intended for students to carry out during nonschool hours” (Cooper et al., 2006, p. 1). This definition of homework includes assignments that are worked on after classes, in study halls, libraries, at home, or elsewhere (Cooper et al., 2006). Managing homework requires students to monitor their motivation, control their moods, persist when facing challenging tasks, and complete homework assignments in spite of other competing tasks such as sports or watching TV (Xu & Corno, 2003). Whether homework is beneficial to student learning is one of the most controversial topics in education research. Most researchers on homework agree that homework research results are inconclusive and thus that its impacts are unclear (Bempechat, 2004). Part of the controversy results from when/where homework activities occur (i.e., out of regular school time and mostly at home), which implies that students whose parents have access to better resources and more time would likely perform better on their homework assignment (Bempechat, 2004). However controversial the question of homework benefits may be, researchers still argue that homework completion has positive effects on student achievement (Cool & Keith, 1991; Cooper et al., 2006), and that its long-term role in the development of achievement motivation is critical (Bempechat, 2004).

Note-taking skills. Note-taking skills require students to concentrate during lectures and coordinate multiple cognitive functions such as writing, listening, and reading (Hartely & Davies, 1978; Kobayashi, 2006). The literature indicates that note-taking is not only an effective learning strategy but is also the most common practice students engage in during class (Kobayashi, 2005). Students of all ages generally believe that note-taking is useful and necessary

for their learning (Faber et al., 2000). The benefits of note-taking have been linked to students paying better attention to lectures (Van Meter, Yokoi, & Pressley, 1994), increased comprehension (Faber et al., 2000; Ganske, 1981; Hidi & Klaiman, 1983), and facilitation of subsequent recall (Van Meter et al., 1994).

Table 1 summarizes the components and sub-components of the behavioral learning strategies described in this section.

School Climate

School climate is defined as organizational characteristics that are persistent in and unique to a particular school (Hoy, Tarter, & Bliss, 1990; Tagiuri & Litwin, 1968). The term has been used interchangeably with others such as school culture, school atmosphere, school environment, learning environment, sense of community, and academic climate (Hoy & Hannum, 1997).

Two of the best known conceptualizations of school climate use personality metaphors (Halpin & Croft, 1963) and health (Miles, 1969). That is, a positive school climate would be characterized by both openness and healthiness (Hoy et al., 1990; Hoy & Hannum, 1997; Hoy & Tarter, 1997). Hoy et al. (1997) identified the following dimensions of school climate: teacher affiliation, academic emphasis, collegial leadership, resource support, and principal influence. Other researchers have highlighted different dimensions of school climate, such as community involvement and influences, characteristics of school community members, and school policies (Purkey & Smith, 1983; Wang, Haertel, & Walberg, 1993). While researchers may have different views on which components are the most critical aspects of school climate, it is generally agreed that school climate creates the norms and values of the school, which then influence teaching and learning programs and practices within a school and, ultimately, a variety of outcomes for school community members (Hoy & Hannum 1997; Hoy & Miskel, 1996; Tagiuri & Litwin, 1968; Wang et al., 1993).

Four school climate components will be discussed here: academic emphasis, teacher variables, principal leadership, and social-environmental variables. These four components are mainly drawn from Hoy and Hannum's (1997) school climate components, with some alterations. First, resource support will not be discussed in our review because there is little research specifically examining the relationship between resource support and students' reading/mathematics achievement. Second, we have broadened the teacher variables category to

include additional teacher variables beyond teacher affiliation. Third, we combine principal characteristics, principal influence, and collegial leadership into a single category called *principal leadership* in our review. In addition, one other key variable shaping a school climate that is missing in Hoy and Hannum's (1997) conceptualization is the social-environmental influences—involving parents and peers—as recognized in Wang, Haertel, and Walberg (1993). Parents' attitudes toward education and child-rearing philosophies influence school climate as well as schools' decisions on instructional programs and policies (Hallinger, Bickman, & Davis, 1996; Wang et al., 1993). Attitudes, achievement, and perceived norms among peers in a school play important roles in shaping school climate (Altermatt & Pomerantz, 2003; Lefgren, 2004; Syvertsen, Flanagan, & Stout, 2009). Thus we have included “social-environmental” as our final domain under school climate. Each of our four school climate domains will now be defined and examined.

Academic emphasis. Research has demonstrated that a critical element in creating a positive school climate involves the perception—among students, parents, teachers, and school administrators—of the importance of academic achievement, which has been called “academic emphasis” (Goddard, 2001; Heck, Larsen, & Marcoulides, 1990; Hoy & Hannum, 1997; Hoy et al., 2002; Mullis et al., 2003; Shouse, 1998). Academic emphasis is defined as the extent to which school communities (i.e., the relevant stakeholders) share a common goal of improving students' academic achievement (Hoy & Hannum, 1997; Hoy et al., 2002). In those schools with a strong academic emphasis, academic achievement (rather than sports or other school activities) becomes a priority in students' school life. In such environments students will tend to actively and attentively participate in class, work hard on homework, respect other students who have good grades, work well with others, and understand the consequences of breaking school rules (Heck et al., 1990; Hoy et al., 2002; Mullis et al., 2003). At the same time, teachers are likely to set high but reasonable goals for all students (Goddard, Hoy, & Hoy, 2000; Hoy & Hannum, 1997; Hoy et al., 2002) and put forth extra time and effort with their students (Hoy et al., 1990; Shouse, 1998). Examples of items measuring academic emphasis include “The learning environment is orderly and serious” and “Students neglect to complete homework” (Hoy & Hannum, 1997).

Teacher variables. What teachers do in the classroom and how they interact with students can contribute significantly to a particular school climate. Characteristics of teachers in a positive

school climate include (a) being committed to their students' learning (Hoy & Hannum, 1997; Ware & Kitsantas, 2007), (b) possessing high drive and self confidence (Heck et al., 1990), and (c) feeling good about their teaching and about the professional support system provided to them (Hoffman, Sabo, Bliss, & Hoy, 1994; Hoy & Hannum, 1997; Shouse 1998). In addition, positive feelings such as trust, collegiality, and intimacy are likely to be shared among teachers (Hoy et al., 1990; Uline, Miller, & Tschannen-Moran, 1998).

Teachers' noncognitive qualities such as persistence, commitment, and effort are closely related to their level of motivation to make a real difference in students' lives (Ware & Kitsantas 2007). Teacher motivation is, in turn, closely related to other teacher constructs that are gaining attention in the school effectiveness literature, including (a) perceived collective efficacy (Bandura, 1997; Goddard, 2001; Goddard, Sweetland, & Hoy, 2000; Goddard et al., 2004; Hoy et al., 2002; Ware & Kitsantas 2007), (b) teacher empowerment (Rice & Schneider, 1994; Short & Greer, 1997; Sweetland & Hoy, 2000), and (c) teacher affiliation (Ames & Miller, 1994; Anderson & Walberg, 1974; Hoffman et al., 1994; Hoy & Hannum, 1997; Rosenholtz, 1989).

Teachers' *collective efficacy* refers to the extent to which teachers as a group share the belief that they have the power and capability to help students learn, to control instructional practices, and ultimately to make a difference in student achievement (Bandura, 1997; Goddard, 2001; Goddard et al., 2004; Tschannen-Moran & Hoy, 2001; Ware & Kitsantas, 2007). Teachers with a strong sense of collective efficacy tend to expend great effort to accommodate individual students' needs, have an optimistic outlook when facing obstacles, and take personal responsibility for student achievement (Ware & Kitsantas, 2007). *Teacher empowerment* is defined as teachers' belief that they control and/or play a critical role in school-wide decisions, ranging from curriculum development to school operations (Rice & Schneider, 1994; Short & Greer, 1997; Sweetland & Hoy, 2000). School-wide decisions also involve students' activities in school, teachers' professional development, and classroom instruction (Marks & Louis, 1997). Another related teacher variable, teacher affiliation, has also been shown to impact teachers' commitment to their students (Anderson & Walberg, 1974; Hoy & Hannum, 1997; Rosenholtz, 1989). Teacher affiliation is defined as teachers' strong sense of belonging to the school in which they teach (Anderson & Walberg, 1974; Hoy & Hannum, 1997; Rosenholtz, 1989).

The three teacher variables described above have been shown to impact both teacher-student and teacher-teacher relationships. They have also been linked to student achievement

(Goddard, 2001; Goddard et al., 2000; Goddard et al., 2004; Hoy & Hannum, 1997). Examples of items that assess these teacher constructs are “Teachers in this school are able to get through to difficult students,” “Teachers in this school really believe every child can learn,” and “Teachers show commitment to their students” (Goddard et al., 2004; Hoy & Hannum, 1997). Teacher empowerment items typically ask about teachers’ desire to participate in decision making processes (e.g., setting school policies or selecting textbooks) and their actual level of such participation (Sweetland & Hoy, 2000).

Principal leadership. The school climate literature has revealed that administrator characteristics are also important in terms of fostering student achievement. Variables associated with administrator characteristics have included number of years of teaching experience, training, self-efficacy, attribution of academic achievement, ability to generate support from parents and teachers, and personal characteristics and values (Hallinger et al., 1996; Heck et al., 1990; Hoy & Hannum, 1997; Kottkamp, Mulhearn, & Hoy, 1987; Leithwood, Begley, & Cousins, 1990; Uline et al., 1998; Wang et al., 1993). Among these administrator characteristics, principal leadership has been consistently recognized as a critical construct in influencing students’ academic achievement (Firestone & Louis, 1999; Hallinger et al., 1996; Leithwood & Jantzi, 2000; Leithwood & Mascall, 2008; Marks & Printy, 2003; O’Donnel & White, 2005; Witzers, Bosker, & Kruger, 2003). Principal leadership is defined as the principal’s ability to influence the actions of school community members, including teachers, parents, students, and district or state personnel (Hoy & Hannum, 1997).

Six main dimensions of school leadership style have been reported in the literature: instructional, transformational, moral, participative, managerial, and contingent (Leithwood & Jantzi, 1999). Current research on principal leadership has tended to focus on a principal’s role as an instructional or transformational leader, especially in curriculum development and creation of an academically-oriented school climate (Hallinger et al., 1996; Leithwood & Jantzi, 2006; Marks & Printy, 2003). Specific characteristics of strong principal leadership include the ability to (a) provide a coherent vision for school programs (instructional), (b) foster discussion of curriculum issues (instructional), (c) identify new missions and goals for the school (transformational), (d) provide intellectual direction (transformational), (e) keep teachers and student morale high (moral), (f) convey high yet attainable expectations for both teachers and students (moral), (g) encourage active participation from teachers in decision making situations

(participative), (h) acknowledge teachers' knowledge and skills (managerial), (i) receive additional resources from superiors (managerial), (j) recognize student accomplishments (managerial), and (k) provide an orderly learning environment with a clear set of discipline rules (managerial) (Darling-Hammond, 1988; Hallinger et al., 1996; Heck et al., 1990; Hoy & Hannum, 1997; Leithwood & Jantzi, 1999; Rowan, 1990). Items assessing principal leadership employed in Hoy and Hannum's study (1997) include "The principal gets what he or she asks for from superiors," "The principal is rebuffed by the superintendent," "The principal treats all faculty members as his or her equal," and "The principal lets faculty know what is expected of them." Leithwood and Jantzi's study (1999, 2000) employed items such as "Our school administrators have a positive presence in the school," "Our school administrators are visible within the school," "Our school administrators are easily accessible to students and staff," and "Our school administrators give evidence in their actions of their interest in students' progress."

Social-environmental variables. The final component of school climate involves social-environmental influences from parents and peers. The literature is full of studies examining parental involvement in relation to students' academic achievement, yet few studies have operationalized parental involvement the same way (e.g., Baker & Soden, 1998). Consequently differences in definition make it difficult to assess cumulative knowledge across studies. However, three of the more prevalent facets of parental involvement include (a) attitudinal components, such as aspirations or expectations for the child's educational success; (b) behavioral aspects, such as parents' assistance with homework or attendance at parent-teacher meetings, and (c) stylistic components, such as parenting style or family interaction patterns.

Research in this area has suggested fairly consistent associations between parental involvement variables and academic achievement. Some of the parental involvement variables are (a) parents' high yet reasonable expectations and aspirations for their child (Fan & Chen, 2001); (b) authoritative, autonomy-promoting parenting style/practices (Baumrind, 1967), which reside midway between authoritarian and permissive parenting styles (Lamborn, Mounts, Steinberg, & Dornbusch, 1991); (c) parents' involvement with their child's school activities, such as PTA/PTO participation, community involvement, and volunteer work (Keith et al., 1993); (d) parents checking their child's homework (Taylor, Clayton, & Rowley, 2004); (e) home supervision and rules (Clark, 1993; Kurdek, Fine, & Sinclair, 1995); and (f) parental

modeling and support of the child's reading, as well as providing a stimulating literacy and material environment (Snow, Barnes, Chandler, Goodman, & Hemphill, 1991).

Another social-environmental variable contributing to school climate relates to peers. As with the literature on parental involvement, there are different definitions of "peers" in the literature (Ryan, 2001). Most of the differences relate to the size of the peer group, which has implications for its composition. Thus a peer group can range from a single best friend, to a few close friends, to a slightly larger group of friends with relatively strong ties, or to the entire age cohort (Brown, 1990). Urberg, Degirmencioglu, and Pilgrim (1997) reported that students in grades 6 through 12 considered their peer groups to consist of about five to eight students. In this review we more generally define peers as a group of friends who share common experiences at school, such as having the same teacher or attending the same school. We define peer norms as the perceived and shared attitudes and beliefs among peers in their peer groups in relation to school experiences and learning, and specifically to academic achievement. Perceived peer norms can influence one's attitudes and beliefs in relation to school achievement, directly through social reinforcement and indirectly through observation (Ryan, 2001). Table 1 shows our four main components of school climate.

Other school climate variables. We acknowledge that the variables described in this section do not constitute all possible school-related variables that could influence school climate. Other variables that pertain to schools' functionality may contribute to a particular school climate. For instance, having appropriate space and sufficient desks, books, and materials have been shown to contribute to the school climate (Earthman, 2002). However, findings on class-size effects have been inconsistent across studies (e.g., Mosteller, 1995; Pate-Bain, Fulton, & Boyd-Zaharias, 1999). Some researchers have suggested that class size reduction may have a greater impact on economically disadvantaged (Public Policy Institute of California, 2002; Ross, 1999). Others have reported that the effects of smaller classes are not necessarily lasting and that only certain groups of students (e.g., high poverty) truly benefit from reduced class sizes (Hanushek, 1999; Ross, 1999).

Other components believed to be important for creating a positive school climate and hence better student outcomes include having an appropriately challenging curriculum that is aligned with state standards and standardized tests, and having a curriculum that is carefully articulated across grades (American Federation of Teachers, 2001). The availability of attractive

extracurricular activities (which may contribute to better student attendance), after-school programs, and enrichment opportunities, and the availability of appropriate tutoring programs also have been identified as important school climate variables (American Federation of Teachers, 2001). Organizational and institutional structures may be contributing to academic success as well (Cohen, Raudenbush, & Ball, 2000). These include (a) the school leadership structure (such as site-based decision making); (b) opportunities for parental involvement (e.g., regular PTA meetings) (Lareau 1989; Lareau & Horvat, 1999); and (c) teacher assignment patterns and policies (e.g., ensuring that the least experienced teachers are not assigned to the “worst” classes or the most difficult classrooms) (Clotfelter, Ladd, & Vigdor, 2006; Peske & Haycock, 2006; Useem & Farley, 2004).

Another domain that has been shown to contribute to school climate and academic achievement is demographics. That is, some studies have shown that minority students perform worse in single-race schools or classrooms—where virtually all students are minorities—than in diverse schools or classrooms (e.g., Hanushek, Kain, Markman, & Rivkin, 2001; Stringfield & Herman, 1997; Trent, 1997). Finally, administrators’ support from the district and their ability to obtain important resources such as highly qualified teachers also can contribute to students’ academic success. Although we recognize these domains are important in school climate and academic success, our focus in this review is only on the four main psychological and behavioral components presented in Table 1 because they represent major aspects of school climate.

Empirical Relationships Between Noncognitive Domains and K-12 Academic Achievement

We now turn attention to the particular relationships that exist among the aforementioned noncognitive variables and academic achievement, in particular K-12 reading and mathematics achievement. Studies referenced in this section have demonstrated “associative” relationships, where no inference is made of causal direction between noncognitive variables and academic achievement.

Student Engagement and Academic Achievement

As noted earlier, the construct of student engagement as a composite (comprised of behavioral, cognitive, and emotional aspects of learning) has emerged in relatively recent literature (circa early 1990s). Since then, a number of studies have shown that academic achievement is strongly associated with certain aspects of student engagement.

As indicators of student engagement, several constructs have received much attention in relation to academic achievement, including (a) student attendance (Luster & McAdoo, 1996; Voelkl, 1997), (b) class participation (Voelkl, 1997), (c) enthusiasm and interest in learning (Alexander et al., 1993; Fincham et al., 1989), and (d) motivation (Eccles, Wigfield, & Schiefele, 1998; Martin & Dowson, 2009; Murphy & Alexander, 2000; Pintrich, 2000; Reiss, 2004; Wigfield, Eccles, & Rodriguez, 1998; Uguroglu & Walberg, 1979). However, in this section we discuss studies that employed the global term, student engagement, and that showed strong ties between student engagement and academic achievement.

Evidence from longitudinal studies. Three major studies have employed longitudinal data to examine the long-term effects of student engagement on academic achievement (Alexander et al., 1993; Fincham et al., 1989; Voelkl, 1997). In the study by Alexander et al. (1993) teachers used a survey from Wave 1 (1976–1977) of the National Survey of Children project (a three-wave longitudinal study carried out by the Foundation for Children Development and Child Trends, Inc.) to rate first-grade students' engagement in the classroom ($N = 790$). The student engagement dimensions that were measured involved both behavioral and emotional aspects of engagement and included restlessness (e.g., fidgets all the time, cannot sit still) and interest (e.g., is enthusiastic, is interested in a lot of different things, likes to express ideas). The study showed that the first-graders' academic engagement behaviors predicted their academic achievement 3 years later (i.e., at grade 4), as measured by the California Achievement Tests of reading (CAT-R) and mathematics (CAT-M), after controlling for race, gender, parental education level, family economic level, and students' CAT-R and CAT-M scores from the first grade. The adjusted $R^2 = .48$ for reading, and the adjusted $R^2 = .56$ for mathematics. This study suggests that there is a lasting association between students' engagement behaviors and their academic achievement.

Another longitudinal study (Fincham et al., 1989) demonstrated that students' academic engagement measured at grade 3 was significantly related to their academic achievement at grade 5 ($N = 108$). Students' academic achievement was measured by the Stanford Achievement Test. Students' self-reports and teachers' ratings were employed to measure students' academic engagement. The indicators of student engagement used in this study were mainly cognitive aspects of engagement, such as whether students attributed their success or failure to ability versus effort, expected to do well and finish assignments, preferred challenging work over easier tasks, asked for help when necessary, showed enthusiasm and persistence, and were proud when

receiving good grades. Results from the study showed that several behavioral engagement measures were associated with reading and math achievement. For instance, teacher ratings of students' learned helplessness at grade 3 showed significant, negative path coefficients for reading ($\beta = -.41$) and mathematics ($\beta = -.32$) scores at grade 5, when controlling for the students' grade 3 achievement scores. In addition, teacher ratings of students on an ability-effort scale, measured at grade 3, showed a significant, positive path coefficient ($\beta = .30$) with reading scores at grade 5 while controlling for the students' grade 3 achievement scores.

Voelkl (1997) examined the relationship between academic achievement (in reading, language arts, mathematics, science, and social science) and student engagement measures. Academic achievement was measured by the Comprehensive Test of Basic Skills (CTBS, CTB/MacMillan/McGraw-Hill, 1990), and student engagement was assessed by (a) self-report on the scale of "identification with school" and (b) teacher ratings on Student Participation Questionnaires (Finn, Folger, & Cox, 1991). Results from the study showed that students' CTBS scores at grade 4 ($N = 1,335$) were significantly related to the teacher rating of student participation at grade 8 ($r = .40$ for White students, $r = .43$ for African American students; $p < .01$). This association indicates that academic achievement continues to relate to school engagement 4 years later.

Evidence from large-scale assessments. The importance of student engagement has been documented in large-scale assessments such as NAEP (Campbell, Voelkl, & Donahue, 1997), ECLS (Finn & Pannoza, 2004), and NELS 1988 (Finn & Rock, 1997; Finn, 2006). In the NAEP project, reading engagement of students at ages 9 ($N = 5,414$), 13 ($N = 5,658$), and 17 ($N = 3,539$) was measured by four student-reading-related activities: (a) borrowing books from the library, (b) talking with friends about books, (c) buying books, and (d) reading more than one book by an author they liked. Students answered whether they had been engaged in any of these reading activities. The results showed that the differences in NAEP reading assessment scores were striking between the most engaged group (i.e., those who reported having done all four reading activities) and the least engaged group (i.e., those who reported having done zero or one reading activity); there was about a 15 score-point difference for students aged 9 and about a 36- to 37-score point difference for students aged 13 and 17 (Campbell et al., 1997). Strong associations between reading engagement and reading scores were found within all three age groups.

Finn and Rock (1997) focused on lower-income students in their secondary analyses of data from the National Educational Longitudinal Study of 1988 (NELS: 88). They reported a strong relationship between student engagement (measured by student self-reports and teacher ratings) and academic achievement. Students in grades 8 to 12 ($N = 1,803$) were divided into three groups based on NELS: 88 achievement test scores in reading and mathematics and grade point averages: (a) resilient completers (i.e., students who finished high school on time, had passing grades, and showed “reasonable” scores on standardized tests); (b) nonresilient completers (i.e., students who finished high school on time, but with poor academic performance); and (c) dropouts (i.e., students who did not finish high school). Findings showed that there were significant differences between the resilient and nonresilient student groups (after controlling for family structure and socioeconomic status) in terms of students’ engagement indicators (e.g., working hard, being prepared, attending school, and participating extracurricular activities). Similarly, significant differences were reported between nonresilient completers and dropouts.

Precursors to student engagement. A number of studies have examined whether certain psychological variables enable students’ academic engagement. For example, social context (i.e., positive influences from parents and teachers) and self-related constructs appear to be the most frequently explored enablers of student engagement (Connell, Spencer, & Aber, 1994; Skinner et al., 1990). To illustrate, Connell et al. (1994) claimed that perceived parental involvement impacts students’ self-efficacy, self-esteem, and responsibility, and that those personal variables play a significant role in the development of students’ academic engagement. In a similar study, Skinner et al. (1990) reported that aspects of social context, such as teacher involvement and students’ perceived self-control, are precursors to academic engagement. In their path analysis modeling, students’ perceived self-control was directly linked to student engagement measures derived from teacher ratings. Student engagement showed a significant, positive link to academic performance as measured by the Stanford Achievement Test on reading and mathematics (the standardized path coefficient = .31; $p < .001$).

Students’ prior academic achievement is another important precursor to student engagement (Finn & Cox, 1992; Voelkl, 1997). For instance, academic achievement measured at grades 1 and 3 was found to be positively related to student engagement at grade 4 (Finn & Cox, 1992), and academic achievement at grade 4 was shown to be related to student engagement at

grade 8 (Voelkl, 1997). Shouse, Schneider, and Plank (1992), using NELS: 88 data, similarly reported that academic achievement is related to students' level of school engagement. That is, test scores and grades were significant predictors of students' academic engagement, as measured by teacher ratings on students performance, completing homework, and staying attentive in class. No significant differences were found in relation to students' school engagement as a function of gender, family structure, family income, parental education level, or school type (Shouse et al., 1992).

Behavioral Learning Strategies and Academic Achievement

Behavioral learning strategies may be measured by the extent to which learners are able to control and manage their own actions, emotions, and surroundings. The literature suggests that (a) time management, (b) test-taking strategies, (c) effort management, (d) help-seeking, (e) homework completion, and (f) note-taking are particularly relevant behavioral learning strategies for students in grades K-12. This section documents the empirical evidence on the relationships of each of these behavioral strategies to academic achievement.

Time management. Research has demonstrated the importance of time management for school-age children. In Smith's study (1992), reading achievement of middle-school students (in grades 7 through 9, $N = 1,584$) was negatively associated with time spent on household chores ($\beta = -.22; p < .05$), listening to the radio and recordings ($\beta = -.18; p < .05$), and talking to and hanging-out with friends ($\beta = -.14; p < .05$). Cooper et al. (2001) reported negative associations of final grades with time spent alone ($r = -.14; p < .05$) and with time spent watching television ($r = -.14; p < .05$) among students in grades 2 to 4 ($N = 428$).

Test-taking strategies. Development of good test-taking strategies is another way to maximize students' school outcomes (Cohen, 2006). A meta-analysis combining 24 published studies (Samson, 1985) examined the effects of teaching test-taking strategies on academic achievement. An overall effect size of .33 was reported, with the general conclusion that there was a positive effect of test-taking skills on academic achievement. The study also reported that these effects were found across all grade levels (preschool, kindergarten, elementary, and secondary schools), for all types of achievement measures (standardized, modified standardized, and classroom tests), across various subjects (reading, mathematics, English composition, and

social science), and for different types of test-taking strategy training (e.g., general test-taking skills and motivation training).

Effort management. Effort is often defined as doing one's best, with the opposite seen as lack of persistence. Using structural equation modeling, Onatsu-Arvilommi et al. (2002) showed that measures of the degree to which elementary-school students lacked persistence were directly and negatively linked to reading achievement (standardized $\beta = -.15$) and mathematics achievement (standardized $\beta = -.25$).

Help seeking. Research has examined the relationship between students who ask questions in class (or not) and academic achievement. For example, in a study by Newman and Goldin (1990), the correlation between second-grade students' reluctance to ask questions and reading test scores was low and not significant ($r = .18$, ns, $n = 20$). However, the correlation between reluctance to ask questions in class and reading test scores was significant for sixth grade students ($r = -.47$; $p < .05$, $n = 23$).

Homework completion. A number of empirical studies conducted over the past decade to examine associations between homework and academic achievement have shown mixed results (e.g., Cool & Keith, 1991; Cooper et al., 2001; Cooper et al., 2006; Keith et al., 1993; Keith et al., 2004; Paschal, Weinstein, & Walberg, 1984; Xu & Corno, 2003). However, a recent meta-analytic study (Cooper et al., 2006) summarizing homework research from 1987 to 2003 supported the assumption of a general positive relationship between homework and academic achievement among school-aged students. Based on nearly 70 correlations from 32 studies, the mean weighted correlations were .24 using a fixed-error model and .16 using a random-error model. The d -index (i.e., standardized mean difference) ranged from 0.39 to 0.97, with the mean d -index (an average effect size across studies) being 0.60. In general, the effect sizes were stronger in upper grades (grades 7 to 12) than in lower grades (kindergarten to grade 6) and in the studies where student reports were used rather than parent reports.

Studies employing structural equation modeling have demonstrated a direct link between homework completion and academic achievement. For instance, in Keith et al.'s (2004) study using the data of the National Education Longitudinal Study (NELS 1988; grade 8, 1990: grade 10, and 1992: grade 12) ($N = 13,546$), the amount of time spent doing homework at grades 10 and 12 was linked directly to high school GPA at grade 12 (i.e., combined measure of grades from English, mathematics, science, and social science), with a standardized path coefficient of β

= .28. A similar but smaller result was reported by Cooper et al. (2001) for students in grades 2 to 4, where the standardized beta coefficient linking homework completion and semester final grades was $\beta = .20$.

Note-taking strategies. Additional studies have documented the importance of note-taking skills in relation to students' school outcomes (Boyle & Weishaar, 2002; Faber et al., 2000; Hong et al., 2006; Peverly et al, 2007). An experimental study conducted by Farber et al. (2000) trained students on note-taking skills for 9 weeks (teaching them, for example, to write down specific comments, recognize reading objectives, think about what is already known about the topic, skim through headings and subheadings, and formulate constructive questions). At the end of the experiment, students in the treatment group at grade 9 ($N = 115$) demonstrated significantly higher scores on reading comprehension tests than the control group students who did not receive any note-taking instruction ($F_{2, 110} = 5.88; p < .01$).

School Climate and Academic Achievement

Schools' academic emphasis and academic achievement. Schools that place strong and clear emphasis on academics have been linked to better student achievement in reading and mathematics (e.g., Goddard et al., 2000; Hoy et al., 1990, 2002). In a study conducted by Goddard et al., (2000), 45 elementary schools were examined, with students' prior achievement, and demographic variables as within-school independent variables in a two-level hierarchical linear model. School academic emphasis explained a considerable amount of between-school variability--about 47% for mathematics and 50% for reading. In another study (Hoy & Hannum, 1997), schools' emphasis on academics significantly predicted achievement in both reading ($\beta = .22, p < .05$) and mathematics ($\beta = .28, p < .01$) among middle-school students after controlling for school SES. Other studies have reported similar results (e.g., Hoy et al., 1991; Hoy & Sabo, 1998; Hoy et al., 2002; Shouse 1998). For instance, in a study conducted by Hoy, Tarter, and Bliss (1990), only academic emphasis ($\beta = .29, p < .01$) showed a significant and unique contribution to student achievement after controlling for 11 school climate factors such as resource allocation, principal influence, teacher morale, supportive principal, closeness among faculty, and engaged teachers.

Teacher Variables and Academic Achievement

Recent literature on teacher variables has highlighted several noncognitive variables in relation to students' academic achievement. For example, teachers' collective efficacy is defined as teachers' beliefs that they, as a group, have the ability to produce positive outcomes regarding student achievement (Goddard, 2001). This collective efficacy construct has been recognized as a key variable in student learning (e.g., Goddard, 2001; Goddard et al., 2004; Hoy et al., 2002). For instance, Hoy et al. (2002) showed that when using school as a unit of analysis, teachers' collective efficacy was strongly correlated with high school mathematics achievement ($r = .65$; $p < .01$; $N = 97$). Similarly, in Goddard et al. (2004), teachers' collective efficacy showed strong correlations with students' achievement in various subject areas – reading, mathematics, science, social studies, and writing. The correlations between teacher collective efficacy and each of these subject areas were measured at both grades 9 and 12 ($N = 96$). All correlations with teacher collective efficacy were significant ($p < .001$), ranging from .39 (writing scores at grade 9), to .63 (math scores at grade 12).

Another noncognitive variable that showed strong associations with student academic achievement is teacher empowerment. It is defined as teachers' belief that they make important decisions on classroom teaching and school policies (Rice & Schneider, 1994; Short & Greer, 1997; Sweetland & Hoy, 2000). Teachers' perceived empowerment is related to their level of participation in decision making, interest in decision making, and their job satisfaction (Rice & Schneider, 1994). In relation to student achievement, teacher empowerment was strongly related to both reading ($r = .58$; $p < .01$) and mathematics ($r = .58$; $p < .01$) achievement among middle-school students ($N = 2,741$) (Sweetland & Hoy, 2000).

Teacher affiliation, defined as teachers' sense of belonging to the school in which they teach, has also shown strong links to students' academic achievement (Anderson & Walberg, 1974; Hoy & Hannum, 1997; Rosenholtz, 1989). Teachers with a strong sense of affiliation are committed to their students, colleagues, and school. They tend to devote extra time and effort to their students' learning, be open to and cooperative with other teachers, and have a strong commitment to creating a better learning environment for students (Ames & Miller, 1994; Anderson & Walberg, 1974; Hoffman et al., 1994; Hoy & Hannum, 1997; Rosenholtz, 1989). Hoy and Hannum (1997) examined various components of school climate—teacher affiliation, academic emphasis, collegial leadership, resources support, principal influence, and institutional

integrity—in relation to reading, mathematics, and writing performance of middle school students ($N = 5,001$). Teacher affiliation had moderately strong correlations with all three subjects: reading ($r = .51, p < .01$), mathematics ($r = .53, p < .05$), and writing ($r = .51, p < .05$) achievement. The teacher affiliation variable also significantly predicted academic outcomes after controlling for SES and other school climate variables: reading ($\beta = .17, p < .05$), mathematics ($\beta = .20, p < .01$), and writing ($\beta = .23, p < .05$). For writing achievement, teacher affiliation was the only significant, positive predictor in a model with all the other school climate and SES measures.

Principal Leadership and Academic Achievement

Over the past 20 years, the influence of principals on shaping, transforming, or maintaining the school climate and ultimately student achievement has been recognized in the literature (e.g., Burlingame, 1987; Firestone & Louis, 1999; Leithwood & Mascall, 2008; Marks & Printy, 2003; Witzers et al., 2003). Principals' influences appear as indirect, rather than direct, influences on student achievement via other intervening variables such as instructional climate or instructional organization (see Hallinger & Heck, 1996; Witziers et al., 2003), although some studies have demonstrated a significant association between principal leadership and student achievement. For instance, in Hoy and Hannum's study (1997) of middle-school students ($N =$ about 5,000), the correlation coefficients between principal leadership and student achievement were as follows: reading ($r = .28; p < .01$), mathematics ($r = .28; p < .01$), and writing ($r = .35; p < .01$). Similarly sized correlations are reported in Uline et al.'s (1998) study, where principal influence was examined from the perspective of middle-school teachers ($N = 86$), specifically with regard to their trust in their principal's integrity. Teachers' ratings of this trust were significantly correlated with students' standardized achievement data across subject areas: reading ($r = .30; p < .01$), mathematics ($r = .30; p < .01$), and writing ($r = .27; p < .05$). Witzers et al. (2003)'s meta-analysis, which included studies conducted between 1986 and 1996, concluded that there is a small but significant direct effect of principals' leadership on student achievement, with Cohen's $d = 0.20$.

Studies have also shown causal links from principal variables to student achievement. For instance, Hallinger et al. (1996) demonstrated a relationship between principals' instructional leadership and the clarity of a school's mission ($\beta = .35; p < .01$), which is related to students'

opportunities to learn ($\beta = .67$; $p < .01$) and to teachers' expectations ($\beta = .36$; $p < .01$). Then students' opportunities to learn and teacher expectation are ultimately related to students' achievement. Heck et al. (1990) highlighted the importance of principals' behaviors through school governance (i.e., providing vision and specific rules involving teachers, staff, students and parents), instructional organization (i.e., management of work structure for teachers and students), and enhancing school climate (i.e., school environment directed toward learning). In their study, these three principal behavioral variables were examined in relation to student achievement. Student achievement was measured by reading and mathematics performance in the California Assessment Program (CAP: State Department of Education). The data were fitted into a structural equation model and showed direct effects from school climate ($\beta = .50$; $p < .01$) and instructional organization ($\beta = .53$; $p < .01$) to student achievement.

Social Environment and Academic Achievement

We reviewed two major social-environmental variables in relation to school climate: parental involvement (e.g., Pianta et al., 2002; Walberg, 1984; Wang et al., 1993) and peer influence (e.g., Johnson, 2000; Lefgren, 2004; Ryan, 2001; Zimmer & Toma, 2000). As mentioned earlier, parental involvement can be viewed in terms of three major components: attitudes, behaviors, and parenting style. Particular parental involvement variables that have been examined most in the literature include (a) parental expectations and aspirations for their children, (b) home supervision, (c) monitoring homework, (d) discussion about school work, (e) participation in school events (such as Parent-Teacher Association meetings, field trips, fund-raising, volunteer work, or community service), (f) arranging for community resources for their children's learning, and (g) discussion about post-high school plans with their children (Clark, 1983, 1993; Fan & Chen, 2001; Gutman & McLoyd, 2000; Hill & Craft, 2003; Hong & Ho, 2005; Keith et al., 1993; Taylor et al., 2004).

Fan and Chen (2001) conducted a meta-analysis of parental involvement encompassing 25 empirical studies and 92 correlations. Overall, they found a medium effect size (r index = .25; $N = 133,577$) for a general indicator of parental involvement in relation to students' academic achievement. When specific components of parental involvement were examined, the parental expectations/aspirations variable showed the strongest correlation to academic achievement (approximately $r = .40$). This correlation to achievement was larger than correlations with other

aspects of parental involvement, such as home supervision ($r = .09$), communication ($r = .19$), and school participation ($r = .32$). Similarly, Keith et al. (1993) showed that the parental-aspiration variable was more strongly correlated with academic achievement ($r = .40$ with a standardized reading test, and $r = .42$ with a standardized math test; $N = 21,814$) than other aspects of parental involvement, including communication ($r =$ about $.20$ for both reading and math tests) and school participation ($r =$ about $.10$ for both reading and math tests). Finally, Hill and Craft (2003) reported that measures of parents' educational values were significantly correlated with reading achievement ($r = .48$; $p < .01$) and math achievement ($r = .40$; $p < .01$) among White students ($n = 49$). These correlations are about the same size as those reported in the studies by Fan and Chen (2001) and Keith et al. (1993).

Measures of parents' participation in school activities also show consistently strong associations with their children's academic achievement. For example, parents' participation in PTA/PTO, community involvement, or volunteer work has shown positive associations with reading ($r = .11$) and mathematics ($r = .13$) achievement in the National Educational Longitudinal Study of 1988 (NELS: 88, $N = 21,814$) (Keith et al., 1993). Similar results have been reported with African American students (Hill & Craft, 2003), where the correlation between parents' school involvement and mathematics achievement was reported to be around $.36$ ($p < .05$; $n = 54$).

Studies of the relationship between students' academic achievement and parents' educational activities at home, however, have shown mixed results. Some studies have reported that parent participation in learning activities at home is positively associated with students' academic achievement ($r = .40$; $p < .001$ for reading achievement; $r = .32$; $p < .001$ for math achievement) (Izzo, Weissberg, Kaspro, & Fendrich, 1999), while other studies have reported no significant relationships (e.g., Hill & Craft, 2003). In addition, when parental support was assessed by students' perception, the strength of relationship between parental support and academic achievement seemed to be a bit lower than that reported by Fan and Chen (2001) or Keith et al. (1993). In Ma and Kishor's 1997 meta-analysis synthesizing 143 studies, a weighted mean effect size of 0.14 was reported between students' perceived parental support and mathematics achievement.

Peers also can exert substantial influences on each other in terms of academic and social lives (Gest, Domitrovich, & Welsh, 2005; Johnson, 2000; Neidell & Waldfogel, 2008).

Gonzales, Cauce, Friedman, and Mason (1996) reported the results from a study with middle-school African American students ($N = 120$). They measured peer support with a 28-item self-report questionnaire asking about students' attachments to peers and parents. Their results showed that peer support was a significant predictor of GPA ($\beta = .23, p < .05$). Other important variables were not predictive of GPA, such as family income, parent education, number of parents in the home, maternal support, and maternal control. The study concluded that peer and neighborhood contexts may have more powerful influences on students' academic achievement than family context variables, at least for African American students.

The effects of peer influences have also been examined with a national sample data from the NAEP 1998 reading assessment. The peer attitude variable in NAEP was assessed via one item, "My friends make fun of people who try to do well in school." Johnson (2000) reported that fourth-graders who agreed with this statement scored about 19 points lower on the 1998 NAEP reading test compared to the other fourth-graders who disagreed with the statement. This 19-point difference was about the size of the score difference between White and African American fourth-graders on the 1998 NAEP reading test (Johnson, 2000).

Finally, Ryan (2001) found that peers' achievement can influence other peers' achievement. That is, in two-level hierarchical linear modeling ($N = 331$), peer-group achievement (derived by averaging the achievement scores of individual peer group members) in the fall predicted the difference in the change in the achievement score of the peer group ($\gamma = .56; p < .001$). Either through peer attachment and attitudes, or peer behaviors and achievement, the influence of peers appears to be an important social context that should not be overlooked with respect to academic achievement.

Summary and Future Directions

The purpose of this paper has been to provide a review of the literature on the relationships between noncognitive variables and K-12 student academic performance. We have identified noncognitive variables that can impact student academic performance and grouped them into the three domains of student engagement, behavioral learning strategies, and school climate. It should be pointed out that we believe these noncognitive domains likely can interact with each other, for example in the case of a school climate variable such as teachers acting as role models for students leading to greater student receptivity to the teaching of learning

strategies. Understanding such potentially complex interactions has not been a focus of this review, but we do believe that further research into these kinds of interrelationships is warranted.

Figure 1 places the three noncognitive domains as well as other, contextual domains into a model of influences on academic achievement. Research has shown that these contextual domains are related to student achievement, and they often have been used as covariates in empirical studies (e.g., in Behrman & Rosenzweig, 2002; Byrnes, 2003; Chiu & McBride-Chang, 2006; Christian, Morrison, & Bryant, 1998; Gosa & Alexander, 2007; Lupart, Cannon, & Telfer, 2004; Marks, 2006; Stankov, & Lee, 2008). While we did not focus on such contextual variables in this review, we acknowledge their importance through their direct and indirect (by possibly working through noncognitive variables) impact on student academic outcomes.

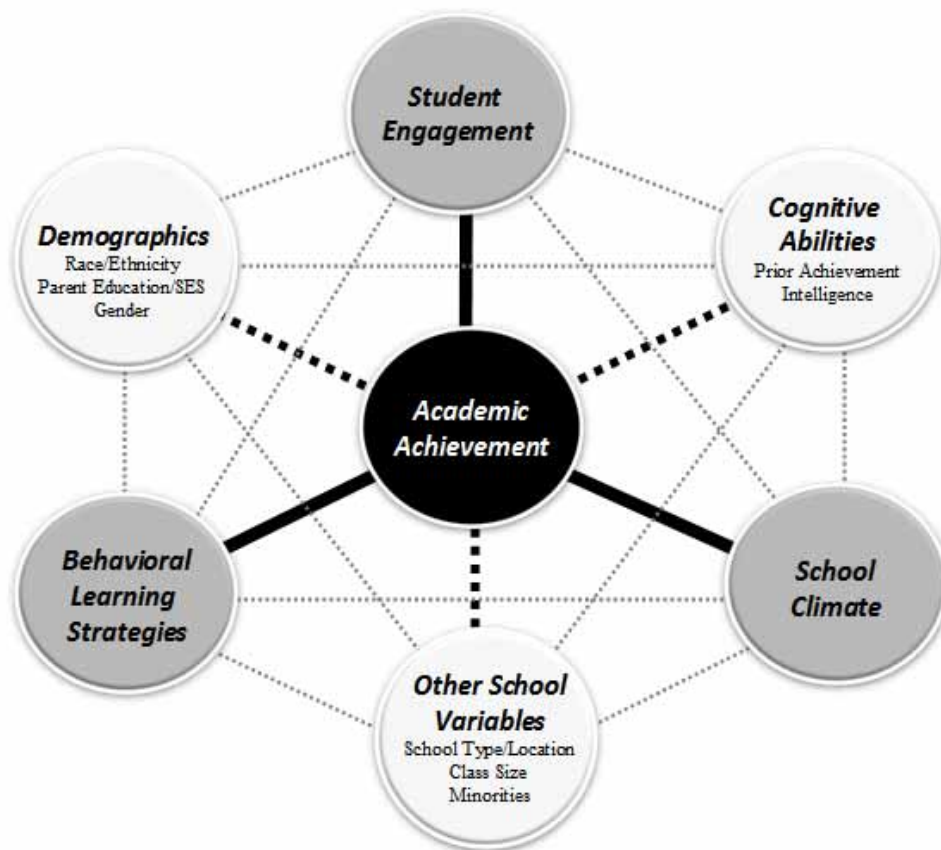


Figure 1. Domains related to academic outcomes.

Thick solid lines in Figure 1 denote the associative relationships between noncognitive domains and student academic achievement, while the links between student achievement and other contextual variables are depicted with thick dotted lines. We have reviewed empirical

research demonstrating associative relationships between noncognitive variables and student outcomes in this paper; it has been very difficult for researchers to go to the next step of empirically demonstrating causality, and consequently the model in Figure 1 portrays only associative links.

Figure 1 also includes the set of hypothetical links among all the noncognitive and contextual variables, shown as thin dotted lines. This model could be simplified by testing these links and thereby establishing their actual presence and directionality, thus yielding a more comprehensive model. Another example of a more developed model could come from integrating multiple models previously proposed in the research literature, such as those by Alexander et al. (1993), Fincham et al. (1989), and Connell et al. (1994). Alexander et al.'s (1993) model linked the student engagement indicators, race, sex, parent education, and family SES with student academic achievement. Fincham et al. (1989) linked student gender with cognitive and emotional engagement and test anxiety, which in turn had significant links to academic achievement. The model presented by Connell et al. (1994) included a number of demographic variables as well as student self-efficacy, perceived relatedness to self and others, emotional and behavioral engagement, and several school outcome measures. Unfortunately, the standalone nature of most studies and their resulting models has been a hindrance to integrating them, and future research should aim towards enabling development of such a more comprehensive model.

Important conceptual questions that are worthy of attention in future research include:

1. What is the nature of the relationships among individual noncognitive constructs?
2. What are the relationships between noncognitive constructs and other contextual variables?
3. Are certain noncognitive domains more important than others in terms of predicting academic success?
4. Is there a single dimension underlying various noncognitive constructs?
5. Are contextual variables essentially measuring some SES variable such as family influence, school resources, or neighborhood effects?
6. What types of interventions are needed to support the development of positive noncognitive attributes?

Noncognitive constructs also can be examined within a developmental perspective, to treat questions such as:

1. What is the role of genetics in the development of noncognitive variables?
2. When do noncognitive variables begin to develop?
3. How stable are noncognitive variables throughout life?

This review was prompted by our interest in understanding why many students having basic or above average cognitive abilities perform below expectations and, conversely, why other students surprise teachers with performances that are better than expected in light of their contextual environment (i.e., teachers, peers, neighborhood, and community). The seminal work on noncognitive variables by Messick (1979) has not been followed up in the educational research field to the extent that we believe is warranted. Our hope is that this review demonstrates that noncognitive variables are important to student academic achievement, given that they appear to explain variance in school achievement not accounted for by either simple IQ scores or other family variables

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Notes

¹ We acknowledge that homework completion conceptually belongs to both student engagement and learning strategy categories. One can argue completing homework is an important indicator of student engagement, especially for younger students. Our categorization of this variable is based on a practical issue – whether we promote homework completion as an indicator of engagement or as a learning strategy. Because we believe homework completion has more practical importance as a strategy than as an engagement variable, we include this variable under the learning strategy category in our paper.