Noncognitive Skills and Educational Achievement: A Research Synthesis

Report

November 2008

Prepared by

Robert Bozick, Ben Dalton, Elizabeth Glennie, Patricia Green, Jean Lennon, Jeffrey Rosen
RTI International
3040 Cornwallis Road
Research Triangle Park, NC 27709

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Executive Summary

Authors: Elizabeth Glennie and Jeffrey Rosen

ES.1 Introduction

While scholarly interest in the noncognitive set of skills dates back several decades (e.g., Bowles & Gintis, 1976; Jencks et al., 1979) and spans multiple disciplines, the relationship between these skills and numerous educational outcomes remains somewhat unclear. This ambiguity may result from the vast number of noncognitive skills and traits and the disparate approaches employed to measure them. Perhaps due to this ambiguity, scholarly research has often neglected these skills in favor of the more readily assessed cognitive skills. However, a growing body of research that suggests noncognitive skills are just as critical—or in some cases more critical—to academic achievement (Heckman, Stixrud, & Urzua, 2006). In fact, in recent years, the very definition of school readiness has undergone revolutionary change as some scholars have recognized and elevated the importance of noncognitive skills to the same level as traditional academic competencies (Pianta, Cox, & Snow, 2007).

To determine the contributions of noncognitive skills and traits to educational outcomes, we synthesized relevant research from a broad spectrum of social science disciplines. We scanned the literature to clarify the definitions of these skills and the various constructs used to measure them, assess the extent to which these constructs are related to one another, report on the strength of the association of these constructs with various educational outcomes at different stages of school, and identify future directions for research. To ensure that articles across disciplined were reviewed consistently, we developed a process for coding key aspects of each study. Appendix A describes our methodology for identifying and coding studies.

With the Spencer Foundation, we identified eight noncognitive skills and traits to investigate:

- motivation

- effort/persistence

- self-regulation

- self-efficacy/sense of control

- academic self-concept

- antisocial/prosocial behavior

- coping/resilience

- attachment/sense of belonging

The sections that follow briefly summarize the major findings for each concept.

ES.2 Motivation

The review of 45 empirical research articles on achievement motivation found substantial debate about the components of motivation, but general concordance in the effects of motivation on academic achievement. Broadly defined, achievement motivation is a desire to successfully accomplish academic activities. There are three broad theoretical approaches to studies of achievement motivation: (1) intrinsic/extrinsic theories, which focus on the classical distinction between intrinsic motivation (based on internally driven interest in or pleasure gained from an activity) and extrinsic motivation (based on external rewards such as social approval or tangible gifts); (2) expectancy-value theory, which argues that expectations of success and the value of the task are the primary components of motivation; and (3) achievement goal theory, which focuses on the intentions students have to achieve mastery or to demonstrate performance. Evidence provided in the reviewed articles supported each theoretical approach and the component of motivation that leads to the highest achievement. Intrinsic motivation, high expectations of success and high task value, and mastery goal orientations all were related to higher tested achievement, educational attainment, and other academically favored outcomes like effort and engagement.

At the same time, the diversity of perspectives and the measures they rely on make evaluating the size of motivation's impact and its role vis-à-vis other theories and other noncognitive skills difficult to ascertain. Additional complications are provided by samples of limited geographic or sociological breadth, frequent use of cross-sectional data, and lack of statistical control for other factors. Existing instruments (mostly student questionnaires) may be improved by examining the extent to which common questions serve as the basis for different psychological factors. This commonality may make multiconcept instruments feasible and further the theoretical integration of the achievement motivation field.

ES.3 Effort

Effort refers to a range of behaviors that are aimed toward mastering a skill or completing a task. Despite its widespread use, there are few analyses that directly develop a theoretical model that explicitly provides criteria for a definitive measurement approach. Instead, most of the research embeds effort within broader discussions of academic engagement, with effort defined as its behavioral component. This review of 32 research articles uses this definition as an organizing tool to assess a disparate group of analyses that loosely use effort as a key construct. Based on these articles, two key dimensions of effort were identified that classify the measurement approaches used: the degree of effort and the degree of specificity. The degree of effort indicates the extent to which students take an active role in their learning. The degree of specificity refers to whether the behavior is geared toward completing a specific task (i.e., a science assignment) or to achievement more generally (i.e., trying hard in science class). Each study is classified based on these two dimensions.

In terms of measurement, because the school day is divided into segments of activities with differences in content (such as art class versus math class) and teaching approach (such as lecture versus group activities), the measure needs to be context sensitive. We also found that having separate measures for effort that is minimally adequate to complete a task (termed "procedural effort") and effort that expresses initiative taking (termed "substantive effort"), allowing for an analysis of the unique contributions of both dimensions toward academic success. Finally, we found some evidence that performance-based indicators of measurement do not correlate with subjective assessments—thus, questioning the sole reliance on subjective indicators, which appears to be the norm in this line of research.

ES.4 Self-Regulation

The precise definition of self-regulated learning (SRL) varies by theoretical orientation, but broadly speaking, it involves the student's evaluation of a task, the selection and application of problem-solving strategies, and potentially a revision of the student's model based on the outcome. The predominant theoretical approach to the study of SRL is a social-cognitive one, which includes factors of the student's environment, such as interaction with teacher and peers.

SRL studies rely on school-based samples, usually of small to moderate sizes, and usually of limited age range, such as preschool and kindergarten, or 9th and 10th grade. Results are analyzed through a variety of multivariate analyses, but without a predominance of interventional studies, causality can only be inferred with varying degrees of plausibility. The field of SRL research has a plethora of measures. For younger populations (preschool and elementary students), observational ratings by teachers and parents are most often used. For middle school and high school students, self-report is the measure of choice. SRL has been measured against a wide variety of outcomes, from specific exam grades to end-of-term grades to standardized test scores. SRL is believed to be affected by global motivation, as well as self-efficacy beliefs, which serve as motivators.

ES.5 Self-Efficacy

Self-efficacy, specifically, academic self-efficacy, is the student's belief that he or she can complete the task at hand. Self-efficacy is subject specific; in other words, an individual's level of self-efficacy can vary across academic domains such as reading, algebra, and writing. Bandura (1977) originally proposed the definition of self-efficacy, which is the predominant theoretical definition used today. Most of the research studies use moderate- to large-sized samples drawn from school populations, and are not generalizable. Mediational or causal modeling, using multiple regression or path analysis, is the most common type of analysis used. Causality has been examined through experimental designs where students were assigned to an intervention designed to improve self-efficacy. Direct causal effects could be estimated from those studies. For nonexperimental studies, regression-based causal modeling was used to test the fit of different causal models, but could not establish causality.

Although multiple measures address self-efficacy in different subjects, almost all studies use the same measurement approach; self-report ratings of the student's confidence in a task-specific ability. A wide range of academic outcomes has been linked to self-efficacy, from very specific skills, such as long

division, to standardized tests and classroom-based subject-specific grades. More specific outcomes have stronger associations with self-efficacy.

Some scholars describe self-efficacy as part of the broader noncognitive skill, academic self-concept. Academic self-concept includes beliefs about competence that are similar to self-efficacy, but academic self-concept also includes affective evaluations. Studies have been conducted to understand how self-efficacy mediates the relationship between noncognitive variables, such as persistence and effort on academic outcomes. Other studies examine how these other noncognitive skills mediate the relationship between self-efficacy and academic outcomes. Theoretical and empirical work demonstrates a reciprocal relationship among the environment, noncognitive skills, and outcomes.

ES.6 Academic Self-Concept

Academic self-concept is usually defined as a student's self-perceived competence in school generally or in a specific academic domain. The 42 articles reviewed tended to agree on a general conceptual definition of academic self-concept, as well as on approaches for measuring it. Conceptually, academic self-concept consists of global self-concept (a student's beliefs about his or her overall ability in school) and domain-specific self-concept (feelings of competence in a particular subject matter such as math or reading). Measurement issues in academic self-concept are not controversial. Remarkably, few instruments are used to measure academic self-concept, and "novel" survey items tend to bear a close resemblance to items found on the more commonly used measurement tools. Perhaps not surprisingly, student self-reports are almost exclusively used to measure academic self-concept. While academic self-concept appears positively related to important academic outcomes like test scores and grades, both the causal ordering of self-concept and academic achievement and the actual strength of that relationship is not clear. Recent studies disagree on whether self-concept causes achievement change or vice versa. As for the relationship between academic self-concept and achievement, the paucity of academic outcomes used in these studies prevents a more complete understanding of self-concept and achievement. Furthermore, because the studies reviewed here often fail to account for basic control variables long known to be important in educational research, the actual strength of the relationship between self-concept and achievement remains muddled.

ES.7 Antisocial and Prosocial Behavior

The review of 40 articles on antisocial and prosocial behavior found general agreement on the definition of such behavior, but less agreement on the role that this behavior plays in producing academic outcomes. Antisocial behavior encompasses physical and verbal aggression, as well as dismissive or exclusionary behavior (e.g., not sharing, spreading rumors). Prosocial behavior includes cooperation, sharing, and encouragement.

Antisocial and prosocial behavior were not typically examined as direct predictors of academic achievement, but either examined as correlations with academic indicators or examined for associations with other noncognitive skills and social relationships. Nevertheless, the large majority of research found that antisocial behavior was negatively related to academic outcomes and prosocial behaviors were positively related to academic outcomes. However, some research suggests that aggression is related to

popularity (and therefore some positive academic outcomes), but that students who are both aggressors and victims fare much worse socially and academically.

Measurements of antisocial and prosocial behavior included questionnaires of teachers and student self-reports, as well as student-based peer-nomination procedures. In peer nomination, students are provided a class roster and answer questions about their peers; this provides information both about individual students' behaviors (which are difficult to observe, as much aggression in particular takes place outside of adult supervision), but also measures of classroom and school climate. The different questionnaire approaches, as well as the fact that many studies used multiple sources (teachers and students, primarily, but also parents and research observers), suggest that research on antisocial and prosocial behavior requires methods that are sensitive to the specific research questions and populations at hand.

ES.8 Coping and Resilience

Coping refers to a range of strategies that people use to respond to various challenges, and includes attitudes, behavior, and relational skills. Resilience refers to academic success in spite of various risk factors including demographic, academic, or psychological factors. Coping skills are related to other constructs described in this report. For example, relational coping skills build upon prosocial behavior, and positive coping attitudes may be related to self-efficacy or academic self-concept. However, these studies used a wide range of coping skills and stresses to which resilient students respond. These varied approaches suggest a lack of theoretical coherence on this topic; it is not clear which skills are most important or whether they are equally beneficial as responses to all types of stress.

Most of the 20 studies reviewed here used a similar measurement approach of focusing on student reports of their own responses to different kinds of stress. Many employed surveys using scaled items where students could state their level of agreement with a statement or how often they acted a certain way. However, each study used a unique instrument to measure coping and examined different kinds of coping skills. Furthermore, authors classified at-risk students differently. Many studies used samples of convenience or students who were already enrolled in a program for at-risk children, so these are not generalizable to other populations, and many used cross-sectional analyses, which do not permit assessing causal ordering of the skill and the outcome. Although most of these studies examined outcomes of grades or test scores, they did not uniformly report a positive association between coping, resilience, and these academic outcomes. These discrepancies may result from the differences in the measurement of skills, the definitions of risks, and the specification of the models.

ES.9 Attachment and Sense of Belonging

Attachment and sense of belonging are two distinct concepts. Most of the research on the former stems from the psychological literature on attachment and separation, and the long-term impacts of those early experiences on later relationships and achievement. Measures of school attachment assess dyadic relationships within school, typically students' relationships with teachers, but also sometimes with peers. Research on sense of belonging is more sociologically oriented and more amorphous, having somewhat blurry boundaries with related concepts such as school engagement, school participation and inclusion, identification, and academic and social integration.

Relative to the other concepts reviewed, few articles were identified that examined the effect of attachment or sense of belonging of academic achievement. In part, this is due to the way that belonging and attachment have been conceptualized. A students' sense of belonging is often hypothesized as having only an indirect effect on achievement: the sense of belonging affects student motivation and effort, which in turn, affects student achievement. Thus, there is a broader literature that examines school belonging as an outcome rather than as an antecedent of school performance.

ES.10   Summary

This research synthesis includes information from more than 250 studies of noncognitive skills. Despite the numbers of studies from the past 10 years on these eight noncognitive skills, much remains to be done. For most of these concepts, research does not permit making claims of causality between the noncognitive skill and academic achievement, and the relative influence of each skill in important academic outcomes is unclear. As for measurement, most concepts seem to have a dominant methodological and analytic approach. For example, academic self-concept researchers almost exclusively use student self-reports to measure self-concept and path analysis to obtain estimates. The chapters that follow provide detailed information about the definitions and measurement approaches for each of the eight concepts and provide some guidance on how research in these areas may be improved.

ES.11   References

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Motivation

Author: Ben Dalton

1.1   Introduction

Motivation is a core psychological concept that has a long history of supporting research. Besides a large literature on general motivation, the educational research literature has produced a substantial body of work on achievement motivation (i.e., motivational processes involved in academic outcomes). Motivation and its attendant concepts involve other noncognitive skills such as engagement, effort, and self-efficacy in a complicated process that interrelates background factors, immediate social contexts, and individual behavior.

This discussion examines recent studies of achievement motivation from major educational and social science research publications between 1997 and 2008. Studies of achievement motivation go back for nearly a century. Therefore, a thorough review of the findings on achievement motivation as it relates to academic outcomes is beyond the scope of this summary. Rather, the focus here is on the definitions of motivation currently employed; methodologies and measures used by the research literature; recent findings about the relationship between achievement motivation and academic outcomes; variations in this relationship across major groups such as grade level, gender, and race/ethnicity; and directions the research agenda is pointing.

1.2   Methods

This review is based on a reading of peer-reviewed literature on achievement motivation published between 1997 and 2008. The works that are part of this review were limited to about 45 empirical journal articles that appeared in the major educational and psychological journals during the identified time frame, as well as another 5 review pieces and a handful of additional seminal works, which provided background and which were identified during the review itself.

The initial search process for articles was similar to that described earlier, with searches conducted by journal (listed in Appendix A) for articles containing the keywords "motivation" and "achievement." Within the over 400 articles returned by these searches, a number were eliminated that (1) focused on teachers, administrators, or parents as the subjects; (2) were small-scale studies outside of the United States with unique populations; and (3) were intended as practitioner guides and were not original research reports. This initial screen left 216 articles for review. A second screening eliminated additional articles where (1) motivation, though used as a descriptor, was typically defined and used as a different concept or idea (such as effort or homework behaviors); (2) motivation was used neither as a primary predictor nor a primary outcome; and (3) a methodological study approach was not used (e.g., reports of personal discussions with a handful of students). This yielded a final group of 45 empirical articles.

1.3   Conceptual Definition

The key challenge for understanding achievement motivation and its connection to academic outcomes is understanding the several theoretical traditions that diverge on the question of which aspects of motivation to focus on. While research is exploring avenues of convergence between differing traditions (Eccles & Wigfield, 2002; Meece, Anderman, & Anderman, 2006), the approaches continue to stand largely on their own.

Achievement motivation, as noted above, can simply be described as the desire to obtain academic success; achievement motivation is a more specific definition of motivation generally, and both are understood as desires to accomplish a task. In contemporary psychology, motivation is understood as a cognitive (mental/instrumental) and affective (physical/emotional) orientation that is situationally and individually variable (Weiner, 1990).

Within this broad framework, however, there are different traditions that focus on particular aspects of achievement motivation. These traditions include intrinsic/extrinsic theories, expectancy-value theory, and achievement goal theory.

1.3.1   Intrinsic/Extrinsic Theories

Intrinsic/extrinsic theories have been grouped together as "interest" or "intrinsic" motivation theories (Eccles, 2004), and they share a common origin and set of terms that focus on how individuals think about and modify their reasons for engaging in tasks.

This framework begins with one of the earliest distinctions in the motivation literature: *intrinsic* versus *extrinsic* motivation (Eccles, Wigfield, & Schiefle, 1998). Intrinsic motivation indicates a desire to achieve based on inherent interest in the task or the pleasure or enjoyment derived from the task. Extrinsic motivation refers to desires to achieve based on external goals such as unrelated tangible rewards (e.g., money) or social pressure. Intrinsic motivation is viewed as a more positive and stable influence on academic outcomes than is extrinsic motivation, though some extrinsic motivators can be effective even over the long-term (Reeve, 2006). Intrinsic motivation also has been explained as a concept of "interest," which may be relatively stable *individual interest* or variable *situational interest*; some researchers claim that situational interest is distinct from intrinsic motivation, however (Hidi & Harackiewicz, 2000; Schiefele, 1999).

Self-determination theory elaborates on the intrinsic/extrinsic motivation distinction by introducing alternative terminology: autonomy/control. According to self-determination theory, intrinsic motivation is created and maintained only as a result of autonomous, self-determined decisions that give individuals a sense of control and power. When people are induced to act on the basis of compulsion, intrinsic motivation cannot develop or is undermined (Deci & Ryan, 1985). More formally, intrinsic motivation is largely an autonomous type of motivation, whereas extrinsic motivation is a controlled form of motivation that varies between mildly controlled to highly controlled (Vansteenkiste, Lens, & Deci, 2006). Thus, understanding motivation requires understanding both the distinction between intrinsic and extrinsic motivation, as well as the more subtle differences in the extent of autonomy experienced in extrinsic motivation.

1.3.2 Expectancy-Value Theory

A second research tradition focuses on the beliefs about success and the value of tasks that children and students report. According to this approach, motivation to achieve is best described as consisting of (1) expectations of success (and attributions of who or what would be responsible) and (2) overall value of the activity or task. Expectancy-value theory defines intrinsic and extrinsic motivating factors (such as interest in a task, external value of the task) as "task values" that are cognitive beliefs about and affective orientations toward the activity (Schweinle, Turner, & Meyer, 2006). A student that values mathematics for reasons of interest or instrumental outcomes (e.g., a higher-paying occupation) will engage in behaviors (e.g., persistence, study choices) that enhance the likelihood of success.

Expectancy-value theory draws from studies of attribution; that is, studies of how individuals explain why events happen. Ascribing outcomes to internal (personal) reasons versus external causes helps create positive expectations that individuals have for future success (Eccles & Wigfield, 2002; Eccles, Wong, & Peck, 2006). These expectations, in turn, directly influence effort and persistence and, therefore, academic outcomes (Trautwein & Lüdtke, 2007).

1.3.3 Achievement Goal Theory

The most prominent recent theory of achievement motivation is achievement goal theory. This perspective focuses on the goals students have for demonstrating competence or achieving mastery. Unlike intrinsic/extrinsic theories and expectancy-value theory, achievement goal theory explicitly situates itself in the study of educational achievement (Meece, Anderman, & Anderman, 2006). It argues that the key characteristic of achievement in educational settings is the positive intention to succeed in specifically academic endeavors. These intentions are described as different types of goals that variously relate to achievement outcomes (Midgley, 2002).

Achievement goal theory therefore distinguishes two types of goals and two types of goal attitudes. Achievement goals can either be mastery (or learning) goals or performance goals. *Mastery goals* are those in which the student attempts to attain facility with a subject or skill. *Performance goals* are those in which the student attempts to demonstrate competence to a judging individual (whether teacher, peer, parent, or other person) regardless of actual gains in abilities or knowledge; the student is likely to seek relative success and to regularly and intently compare himself or herself to peers. Mastery goals support more engagement and greater learning compared with students having performance goals.

Goal attitudes are divided between *approach* and *avoidance* attitudes (Elliot & Harackiewicz, 1996). Students with an approach focus positively attempt to reach their desired goal. In contrast, students with avoidance focus attempt to avoid failure and/or unfavorable judgments. Both approach and avoidance attitudes can be applied to mastery and performance goals. A performance approach goal would be one in which a student attempts to meet a minimum standard of competence; a performance avoidance goal would be one in which a student is primarily concerned with avoiding failing to meet the competence standard. Though both performance goals have the same competence target, the difference in psychological attitude can affect concentration, persistence, and other factors related to eventual achievement.

Likewise, mastery goal orientations can be described as mastery approach and mastery avoidance. A mastery approach goal would involve striving to learn the material at hand; a mastery avoidance goal would involve attempting to avoid misunderstanding or futile learning (Pintrich, 2000). Most research has examined mastery goals overall and not explored the implications of possessing a mastery approach versus a mastery avoidance goal.

Overall, the hierarchy of positive influence in achievement goal theory runs from mastery approach goals to mastery avoidance goals, and from performance approach goals to performance avoidance goals. Students with mastery and approach goals are predicted to have better outcomes than students with performance or avoidance goals.

1.3.4 Other Aspects of Motivation

Some additional concepts employed in the motivation literature are worth mentioning. Amotivation, or the lack of motivation, is a concept that has often been used with intrinsic/extrinsic motivation research (Ratelle et al., 2007, Zanobini & Usai, 2002). Some theoretical work defines optimal motivation experiences as those that involve challenging but not overwhelming tasks that are aligned in a series of engaging tasks; this is referred to as the experience of "flow" (Csikszentmihalyi, 1988).

In addition, some recent work has argued that the specific content of goals—whether relational, community-oriented, monetary, safety-oriented, or so forth—should be considered when analyzing motivation (Boekerts, de Koning, & Vedder, 2006; Vansteenkiste, Lens, & Deci, 2006). These researchers argue that classroom contexts involve multiple nonacademic goals such as social goals and other personal goals and that these simultaneously affect academic and nonacademic outcomes in context-sensitive ways.

1.4 Studies of Achievement Motivation and School Performance, 1997–2008

This section describes the methodologies employed, the definitions and measurement approaches used, and the substantive findings of the 45 empirical articles reviewed. Table 1-1 provides a summary overview of many of the article counts reported in the text.

1.4.1 Methodologies Employed

Recent work on achievement motivation has covered a range of samples, research designs, analysis strategies, and conceptual approaches. Many of the characteristics of this research reflect the disciplinary orientation of its authors and audience—that is, psychological and not sociological or econometric. Of the articles reviewed here, a substantial proportion (39 studies) used geographically restricted samples, with a little less than half of studies (21) having sample sizes of less than 500. The geographically restricted samples often focused on students in one state or city and, in many cases, in one or two schools. In addition, a substantial proportion of studies (39 articles) focused on students that were from specific locales such as an urban or rural location in a specific state or city. Articles rarely addressed questions about the applicability of the results to a national population or to other groups not covered by

Table 1-1.   **Approaches to Studies of Motivation**

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	0
Elementary	14
Middle	8
High	11
Multiple	12
What is the time frame of the study?	
Cross-sectional	25
Longitudinal	20
What is the method of analysis?	
Case study	1
Bivariate	3
Multivariate	35
Multilevel	1
Is sample generalizable?[a]	
Sample of convenience (an existing intervention program)	2
Students identified as at risk	2
Within school	12
Within district or region	26
Nationally representative	7
Can study be replicated?	
Data and survey are available	2
Questionnaire is available	39
No, neither data nor survey are available	4

[a] The first two rows in this category refer to characteristics that overlap with the last three categories (i.e., are not exclusive).

the study (such as suburban or rural students, or students of different races or ethnicities). The only nationally representative studies involved three studies conducted or sponsored by the U.S. Department of Education's National Center for Education Statistics (High School and Beyond, National Education Longitudinal Study of 1988, and PISA 2000) and several studies conducted by the authors but not publicly available (as far as known).

In more than half of the studies reviewed (25 articles), the research design was cross-sectional. The cross-sectional studies were typically studies of items and scales constructed from a new or modified questionnaire and/or were exploring relationships between existing scales and additional scales. In most studies, including the scaling studies, multivariate statistical analysis was employed, although this ranged from analysis of variance techniques to more sophisticated structural equation modeling and multilevel regression analyses.

Nineteen articles used their measure of motivation as a predictor for other outcomes, including academic outcomes, while an additional 15 studies used motivation as part of a broader analysis in which motivation mediated or moderated effects of other variables on other outcomes (i.e., motivation was both an outcome and a predictor). The remaining 11 studies used motivation as an outcome only, such that these studies tested scales of motivations without exploring influences or outcomes of motivation.

1.4.2 Definitions of Motivation

Motivation was typically defined in one of three ways corresponding to the major theoretical approaches described above. The largest tradition represented in the past 10 years was achievement goal theory, which was used by 23 articles. As noted earlier, most articles used mastery, performance approach, and performance avoidance measures and did not distinguish mastery approach from mastery avoidance goals.

Intrinsic/extrinsic motivation theories and motivation as "interest" were the next most common definitions of motivation employed, used in 16 of the reviewed studies. These articles were about evenly split between global measures of intrinsic and extrinsic motivation and more specific self-determination theory measures of extrinsic motivation levels. Expectancy-value theory was used in nine articles, with some articles focusing on expectations, some on task value, and some on both aspects of this perspective.

In addition, several articles claimed to measure motivation but, when examined closely, clearly used distinct constructs such as effort or discipline (Graham, Taylor, & Hudley, 1998; Singh, Granville, & Dika, 2002; Wentzel, 1997).

In total, this tally adds to more than 45 articles because some articles used multiple perspectives or a global motivation scale related to several definitions. For example, Anderson and Keith (1997), in their study of at-risk students using the High School and Beyond study, defined motivation both attitudinally (as interest in school and aspirations for educational achievement) and behaviorally (as time spent on homework, for example). Indeed, the distinction between articles is not clear-cut, even among those defining their approach to be in alignment with a given theory. For example, articles that used intrinsic motivation theories and those using a definition of task value (expectancy-value theory) discussed those terms in similar language, as elements of enjoyment or interest.

1.4.3 Measures of Motivation

In terms of specific measurement tools, most of the studies reviewed (40 articles) used student reports of motivation from questionnaires. Motivation was typically constructed from multiple items using factor analysis. Multiple standardized surveys served as sources for most scaled measures. These are difficult to summarize across studies because of the sheer variety of questionnaires from which they come and the number of adaptations that individual researchers make (e.g., changing question wording, adding or deleting items from a previously published scale, employing differences in sample characteristics that result in different sets of factors emerging from the data). In addition, most item sets were developed by prior researchers and reported in earlier publications, and many questionnaires have been modified over time so that there are several existing forms in the literature (versions often propagated by the original questionnaire authors). Finally, while most researchers used named surveys, a number of questionnaires or scales were not given specific names, especially those articles examining expectancy-value theory.

Nevertheless, the provenance of most scales and items was reported in article text, along with some reliability information in terms of alpha coefficients, which were typically around .80 and above. Four example measurement instruments used in multiple studies are listed in Table 1-2, along with some

Table 1-2. Measures of Motivation:[a] Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Patterns of Adaptive Learning Survey	Student	Mastery approach, mastery avoidance, performance approach, and performance avoidance goals	Varies	6	Elementary to high school students	Gehlbach (2006)
Young Children's Academic Intrinsic Motivation Inventory (also high school version)	Student	Reading, math, science, social studies, and general school motivation	Varies	2	Elementary to middle school students	Ginsburg-Block & Fantuzzo (1998)
Harter's Intrinsic/Extrinsic Motivation Scale	Student	Extrinsic and intrinsic motivation	Varies	2	Multiple ages	Lepper et al. (2005)
Inventory of School Motivation	Student	Mastery approach, mastery avoidance, performance approach, and performance avoidance	Varies	2	Multiple ages	McInerney & Ali (2006)

[a] Full list of named questionnaires used in the reviewed studies: Patterns of Adaptive Learning Survey, the Academic Motivation Scale, Young Children's Academic Intrinsic Motivation Inventory, the TARGET system, the California Measure of Mental Motivation, Harter's intrinsic versus extrinsic motivation scale, Motivation for Reading Scale, Inventory of School Motivation, Motivated Strategies for Learning Questionnaire, Achievement Goals Questionnaire, and the Ulm Motivational Test Battery. Note that a number of studies did not identify named questionnaires, although sources were typically documented.

characteristics of these instruments (because the relationship between reported instruments and the original or source instruments is not always clear from the articles themselves; also, because most motivation instruments were student self-reported questionnaires, only these example instruments are described). The names of other instruments used in the reviewed studies also are listed.

Despite the different conceptualizations behind various instruments, some of the questions are shared or roughly similar to one another. For example, both "enjoyment value" (expectancy-value theory) of a mathematics class and interest in a subject might be elicited by asking for agreement/disagreement to the statement "I love learning math." Similarly, both performance goals and extrinsic motivation might be measured by soliciting agreement/disagreement to a statement like, "I want to get good grades to please my teacher." This finding suggests one possible avenue for future integration, although new data collection instruments and efforts would be needed to test a multiconcept scale based on shared items.

Another student questionnaire method involved peer-nomination procedures. Here, students rated classmates or school peers for their level of interest or effort (e.g., Graham, Taylor, & Hudley, 1998). This could be used as an individual student measure or as a way of gauging classroom goal structure.

Other data-gathering methods include teacher reports (especially for measures of classroom goal structure) via questionnaire (e.g., McDermott, Mordell, & Stolzfus, 2001) and experience sampling methods (ESMs), which involve asking students to routinely reflect on their experiences while engaged in (or immediately after) the activity (Schweinle, Meyer, & Turner, 2006). Three studies used researcher observations; these were case studies or experimental studies defining motivation implicitly or in idiosyncratic ways (e.g., priming with motivational prompts [Barker, McInerney, & Dowson, 2002], or as time on a task [Holmes et al., 2007]).

1.4.4 Substantive Focus and Findings

As noted, most articles used motivation as a predictor of other outcomes (whether as a direct predictor or as an intervening variable between the outcome and another predictor). Twenty-six articles examined the relationship between motivation and achievement or attainment outcomes. The most common achievement or attainment outcomes were standardized test scores and grades obtained from transcripts (split about evenly), with one study using teacher reports of achievement (Graham, Taylor, & Hudley, 1998) and one study examining high school completion (Ratelle et al., 2007) as outcomes.

Five articles examined motivation as a predictor of academic behaviors and beliefs. Another 14 articles examined motivation as an outcome or as the central focus of a scaling study.

Consistent with the history of motivation research, research consistently observed that motivation was a significant influence on achievement outcomes or academic behaviors. Of the 26 studies that analyzed the relationship between motivation (however defined) and achievement or attainment outcomes, 21 reported positive associations or influences, 4 reported no relationship, and 1 reported a negative relationship (in this study, the negative relationship between intrinsic motivation and grades was inconsistently observed [Zanobini & Usai, 2002]). For example, in one of the few studies to examine mastery avoidance goals, Witkow and Fuligni's (2007) 2-year longitudinal study of 9th and 10th graders in the Los Angeles area found that approach goals (whether for mastery or performance) were positively

related to grade point average (GPA); mastery avoidance goal was negatively related to GPA, however. The study further found that mastery approach goals were associated with the overall intrinsic value of schooling, but that performance approach and avoidance goals of any kind were unrelated to school intrinsic value.

Witkow and Fuligni's study is representative of many of the studies that involve examination of multiple relationships in which motivation served as a key. For example, Eccles, Wong, and Peck's (2006) longitudinal study of African American 7th and 8th graders in Maryland found that the value of schooling was positively related to grades (conforming to expectations of the expectancy-value perspective) but was modified by perceptions of discrimination. Students who perceived discrimination in their lives or the lives of their peers valued school less, which therefore had an indirect influence on grades. Most of the studies reviewed (besides pure scaling studies) explored pathways or complex relationships such as these between motivation, other behavioral or attitudinal variables, and academic outcomes.

In the handful of studies that examined the relationship between motivation and academic beliefs or behaviors, all found that positive aspects of motivation (i.e., intrinsic motivation, mastery orientations, or expectations for success and high task value) were associated with positive academic behaviors. For example, Turner, Thorpe, and Meyer (1998) examined the emotions associated with failure and how they relate to both motivation, defined as having a mastery, performance approach, or performance avoidance goals, and to self-regulatory behaviors such as thoughtfulness and persistence. Possessing academic performance goals was negatively associated with self-regulatory academic behaviors, but were mediated by the effect of negative feelings after academic failure. In other words, having performance goals appears to prime students for negative reactions to failure or difficulty with studies; these negative reactions in turn reduce the likelihood they will engage in helpful learning strategies. This study is limited by being a cross-sectional study and therefore unable to identify temporal pathways, but its suggestive findings continue to support the argument that mastery goals are preferable to performance goals with respect to achievement.

The studies that examined motivation itself as an outcome were either descriptive scaling studies or intervention studies. One of the most important descriptive studies was authored by Gottfried, Fleming, and Gottfried (2001). They used a small sample (n = 96) of children from Fullerton, California, whose intrinsic motivation was first assessed at age 9 and then four additional times up to age 17. The authors' principal purpose was to examine the stability and reliability of intrinsic motivation over time. The study found that intrinsic motivation declined over time in reading, math, and science, but remained relatively stable in social studies and for general school motivation. The study also found that intrinsic academic motivation is a stable concept at multiple ages and can be measured and compared over time reliably. McInerney and Ali (2006) represented a similar effort (with similar positive result) to validate achievement goal measures of motivation cross-culturally.

1.4.5 Variations Across Time, Socioeconomic Status, Gender, and Race/Ethnicity

The validity/reliability studies were some of the few cases in which students from different populations were explicitly compared or variations in motivational processes by subgroups were a major

focus of analysis. Gottfried, Fleming, and Gottfried's (2001) study showed explicitly that a general intrinsic motivation scale is reliable over time; many other studies that used longitudinal scales implicitly argued that motivation can be reliably measured over time; although, the longitudinal time scales involved were rarely more than 2 years, meaning that differences between, for example, elementary and high school students were not part of the study.

Beyond grade-level differences, social class and race/ethnicity variations were referenced but typically not carefully studied in recent research, making generalizations about variations across such groups difficult to identify. Race/ethnic examinations were typically secondary, and evidence supports both differences and broad similarities across racial and ethnic backgrounds (McInerney et al., 1997; Holmes et al., 2007; Shim, Ryan, & Anderson, 2008). However, one study found that Asian American students had poorer internal motivation and greater fear of failure than non–Asian American students (Eaton & Dembo, 1997).

Gender differences were more commonly studied (most samples were gender balanced, compared with studies that included students primarily of one or two racial/ethnic groups or students from specific social class origins), though again rarely in a systematic, explicit way. One review piece by Meece, Glienke, and Burg (2006), however, summarized research from prior periods (much done in the 1980s) that indicated gender differences in motivation conforming to stereotypical patterns, with boys indicating greater interest in mathematics and science and girls indicating greater interest in language arts. These differences appear to be associated with differences in attributional patterns (attribution theory being a prime contributor to expectancy-value theory) and differences in self-competence—girls were more likely to attribute success in math or science to effort than ability, though evidence did not show that boys did the same in language arts. These differences are measureable at an early age, in some cases before the start of elementary school. One undeveloped area of research concerns gender differences in achievement goals, with more recent research identified by Meece, Glienke, and Burg (2006) indicating no gender differences in math (p. 360), while other research suggests such differences may have an influence on achievement outcomes (DeBacker & Nelson, 2000).

Besides these factors, one study explicitly addressed at-risk students and compared them with average students; in this case, the authors found that the influence of motivational factors was slightly larger for at-risk than regular students (Anderson & Keith, 1997).

1.4.6 Assessing the Importance of Motivation

The Impact of Motivation

Although the large majority of studies reviewed here indicated a positive effect of motivation on achievement outcomes, there are two aspects of the literature that make it very difficult to come to conclusions about the overall importance of motivation as a contributing factor to school success.

First, many of the studies reviewed, while employing multivariate regressions, fail to utilize more sophisticated analytic techniques that could make study results more definitive. Sometimes this is an issue with study design itself, as when cross-sectional data are employed and the causal relationships become difficult to disentangle. Sometimes this is a result of the use of more exploratory techniques of analysis

(for admittedly exploratory purposes), such as analysis of variance, or the use of simple regression techniques when multivariate techniques are called for. One key limitation for a subset of the studies is lack of statistical controls for other measures that might be involved as distal or proximate influences, including individual measures of social class, race/ethnicity, family structure, or student expectations. In addition, studies were rarely comparable in the list of these factors that they did include.

The other major reason for a lack of definitiveness in the literature is the extent to which motivation is defined and measured in different ways. This, of course, is driven by theoretical divergence among researchers. An expectancy-value theory might explore expectations for success, while a self-determination approach focuses on intrinsic motivation or interest in a task; achievement goal theories ask questions along a different dimension of inquiry. While work continues in relating and integrating these different approaches (see, e.g., Eccles & Wigfield, 2002; Hidi & Harackiewicz, 2000), most research is carried out firmly within the orbit of a single perspective.

These differences in orientation relate to different measures of motivation. As indicated above, there are a plethora of questionnaire-based scales for measuring motivation, including multiple questionnaires for similar concepts. The scales that measure different concepts of motivation are based on different questions (though there are some areas of overlap, as noted previously), have different numbers of questions, possess different levels of reliability, and may have other statistical property differences. This makes comparing motivational effects extremely difficult across studies. The widespread practice of adopting only a subset of items from a larger validated scale and even changing wording to better suit the researcher's tastes creates additional complications that have unknown consequences.

At the least, the literature could be better served by an instrument-reduction effort that integrates questionnaires within theoretical traditions. A further effort might involve developing a multiconstruct instrument that eliminates the overlapping items common to different theories' questionnaires.

Links between Motivation and Other Noncognitive Skills

Achievement motivation is generally thought to be part of a process that includes background factors and situational variables that influence motivation (Eccles, 2004; Guthrie et al., 2006; Legault, Green-Demmers, & Pelletier, 2006), other cognitive and affective influences on motivation (Meece, Anderman, & Anderman, 2006), and variables that intervene between motivation and academic outcomes (Eccles & Wigfield, 2002). In such a complex process, other noncognitive skills play key roles.

For example, attribution, self-efficacy, and self-concept all play related roles in shaping expectations for success—one of the twin pillars of expectancy-value theory. Achievement goal theory includes a strong emphasis on the social comparison processes involved in performance goals (e.g., Regner, Escribe, & Dupeyrat, 2007). The genesis of achievement goals may involve core ideas about academic self-concept and self-esteem.

Within any given theoretical tradition, factors such as engagement, effort, and persistence—as well as other learning strategies or behaviors—may mediate between motivation and academic outcomes (Lau & Nie, 2008; Marchand & Skinner, 2007; Trautwein & Lüdtke, 2007; Turner, Thorpe, & Meyer, 1998). For example, Marchand and Skinner (2007) found that autonomous motivation was positively

related to help-seeking (as were other noncognitive skills). Walls and Little (2005) found that intrinsic motivation positively influenced beliefs about personal agency (attributions) which, in turn, influenced grades and school well-being.

1.5   Discussion

In the presence of a diverse theoretical and empirical research literature, the evidence is remarkably consistent: intrinsically motivated students, students with high expectations of success and interest in subject matter or tasks, and students with mastery goals are all more likely to succeed than students with alternate motivations. Additional factors such as the role of perceptions of discrimination, limited extrinsic rewards, and interactions between subject matter and gender of students continue to be explored, but the basic conclusion remains stable: motivation is a central factor in producing academic outcomes.

The strengths and weaknesses of the achievement motivation literature are its diverse approaches and wealth of evidence and instruments. Progress in integrating motivational approaches requires both theoretical explication of the relationship among motivation control (intrinsic versus extrinsic), expectations, values, and achievement goals—as well as their relation to factors that influence them and intervening skills and behaviors that directly produce academic outcomes—and empirical work that attempts to relate and consolidate measurement instruments. The primacy of the student-based questionnaire approach will likely remain unchallenged, although experimental, case study, and other methodologies will continue to play a role at the margins.

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Effort

Author: Robert Bozick

2.1 Introduction

Effort is a widely used concept within educational research that blends together a range of behaviors that are aimed toward mastering a skill or completing a task. Despite its widespread use, there are few analyses that directly develop a theoretical model that explicitly provides criteria for a definitive measurement approach. Instead, most of the research embeds effort within broader discussions of academic engagement, with effort defined as its behavioral component. This review uses this definition as an organizing tool to assess a disparate group of analyses that loosely use effort as a key construct. Unlike other analyses of noncognitive skills reviewed in this report, effort is mostly used as an outcome rather than as a predictor. As such, this review emphasizes the measurement approaches. First, we discuss the methods used to select articles, followed by a discussion of the different conceptual dimensions used in the articles. Next, we provide an overview of the measures used and their relationships with other constructs. We conclude with a discussion of the methodological implications for defining and using measures of effort.

2.2 Methods

In our initial search for articles, we extracted citations that had either effort or persistence listed as the keywords; this yielded more than 3,000 entries. We then reviewed a sample of these to determine additional keywords that would be fruitful in refining the search criteria to identify the most relevant articles. We settled upon the keywords "effort," "persistence," "on-task," and "engagement." Next, we identified and reviewed the abstracts of all articles that included these keywords to determine their adequacy for the project. We eliminated articles that lacked "effort" as a construct of substantive focus, that did not provide original empirical analyses, or that were practice-oriented publications. A final sample of 32 articles forms the basis for this review.

2.3 Conceptual Definition

Though there were differences in focus, there were no contrasting intraconcept components such as with other concepts studied in this report (i.e., intrinsic versus extrinsic motivation). Instead, the definitions used by the researchers reflect different dimensions of effort, guided by the aims of the research rather than a particular theoretical perspective. We identified four conceptual definitions in the 32 articles studied: effort as behavioral engagement, effort as the exertion of energy, effort as general achievement-related behaviors, and effort as task-specific behaviors. These different dimensions of effort complement one another; they are neither contradictory, nor are they mutually exclusive. As a means to develop guidelines for assessing measurement properties of this construct, we briefly define and discuss each of these dimensions in turn.

Used in 13 of the studies, *behavioral engagement* was the most widely used definition. These studies conceptually embed effort in the larger constellation of cognitive and behavioral traits that characterize school engagement, defined as "student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann, Wehlage, & Lamborn, 1992, p. 12). Effort here is the behavioral manifestation of engagement, defined as "student's energized, enthusiastic, emotionally positive, cognitively focused interactions with academic activities" (Kindermann, 2007, p. 1186). The methodological implication in applying this definition is that these "cognitively focused interactions" should be observable. In other words, behaviors are used as (both direct and indirect) indications of cognitive processes and psychological investments that cannot be observed easily.

In addition to being observable, these behaviors involve the *exertion of energy*. This dimension of effort was used as the conceptual definition in five of the studies. Agbuga and Xiang (2008) distinguished effort from similar constructs: "effort reflects the overall amount of energy or work expended over the course of learning" (p. 181). The exertion of energy requires that students go beyond the basic requirements for a given class or task (such as showing up to social studies class on time) and express motivation for and a personal investment in the given class or task (such as working hard on assignments in social studies class). This is analogous to distinctions made in the broader student engagement literature between procedural engagement and substantive engagement—the former refers to completion of learning tasks, whereas the latter refers to active involvement in learning tasks. The methodological implication of this conceptual definition is that effort can be quantified as an amount of energy exerted over a specific period of time and it can be partitioned into behaviors that are procedural and behaviors that are substantive.

The last two definitions focus on the specificity of the measure: Effort either can be achievement oriented in general or it can be task specific. Five of the studies conceptualize effort as *general achievement-oriented behaviors*, where the school or the class provides the parameters within which effort is made. In six of the studies, effort is conceptualized as *task-specific behaviors*, where a particular problem or task provides the parameters within which effort is made. For example, a general achievement-oriented behavior would include turning in science homework on time, while task-specific behaviors would include spending extra time on a science project. The former is related to science class in general, while the latter is related to a specific task within science class. Gilmore, Cuskelly, and Purdie (2003) further defined task-oriented effort as the persistent manner in which a student "solve[s] a problem or master[s] a skill or task which is at least moderately challenging for him or for her" (p. 412). In some cases, the researchers likened task-specific effort to the concept of "flow"—complete concentration, absorption, and focus when performing an activity (Ainley, Enger, & Kennedy, 2008; Shernoff & Vandell, 2007).

The remaining articles employed more nuanced conceptualizations of effort. For example, Fincham, Hodoka, and Sanders (1989), indirectly identified effort by focusing on inattentive and disengaged behaviors in the classroom to indicate a lack of effort. DeLuca and Rosenbaum (2001) took a distinctly sociological approach, considering effort as a form of individual agency, evidenced by

attainment beyond what would be predicted by structural factors. Lastly, one article did not provide a conceptual definition of effort (Hardre, Crowson, Debacker, & White, 2007).

Taken together, these different dimensions of effort provide guidance for organizing and assessing the measures used in the 32 selected articles. First, in contrast to some of the cognitive and affective constructs reviewed in this report (e.g., self-concept, self-efficacy), effort is a behavior that can be observed. Second, effort can be quantified across a specific period of time and can be separated into behaviors that are required for a given class or task (procedural) and behaviors that express motivation for and a personal investment in a given class or task (substantive). Finally, effort can be either achievement oriented in general or specific to a problem or task. We used the directives derived from the definitions used in the articles to form a typology that classifies and organizes different measurement approaches, a topic to which we now turn.

2.4   Measurement Approaches

Table 2-1 shows the distribution of the approaches used in the sample. In terms of modal frequencies, the majority of the articles used within-school data that are not available for replication. Most of the studies used cross-sectional data on elementary or middle school students and employed multivariate statistics.

Table 2-1.   Approaches to Studies of Effort

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	1
Elementary	10
Middle	9
High	4
Multiple	8
What is the time frame of the study?	
Cross-sectional	17
Longitudinal	15
What is the method of analysis?	
Case study	2
Bivariate	4
Multivariate	23
Multilevel	3
Is sample generalizable?	
Sample of convenience (an existing intervention program)	1
Students identified as at risk	0
Within school	9
Within district or region	19
Nationally representative	3
Can study be replicated?	
Data and survey are available	6
Questionnaire is available	12
No, neither data nor survey are available	14

We created a typology of measurement approaches, shown in Figure 2-1, based on two central dimensions of effort: the degree of effort, represented by the columns, and the degree of specificity, represented by the rows. Each measurement approach is classified as the by-product of both dimensions. Within each box is the number of studies that align with these varying definitions. Due to the use of multiple measures within the same study, the sum total of all the cells (N = 41) is greater than the total number of studies used in this review (N = 32).

Figure 2-1.　Measurement Typology of Effort
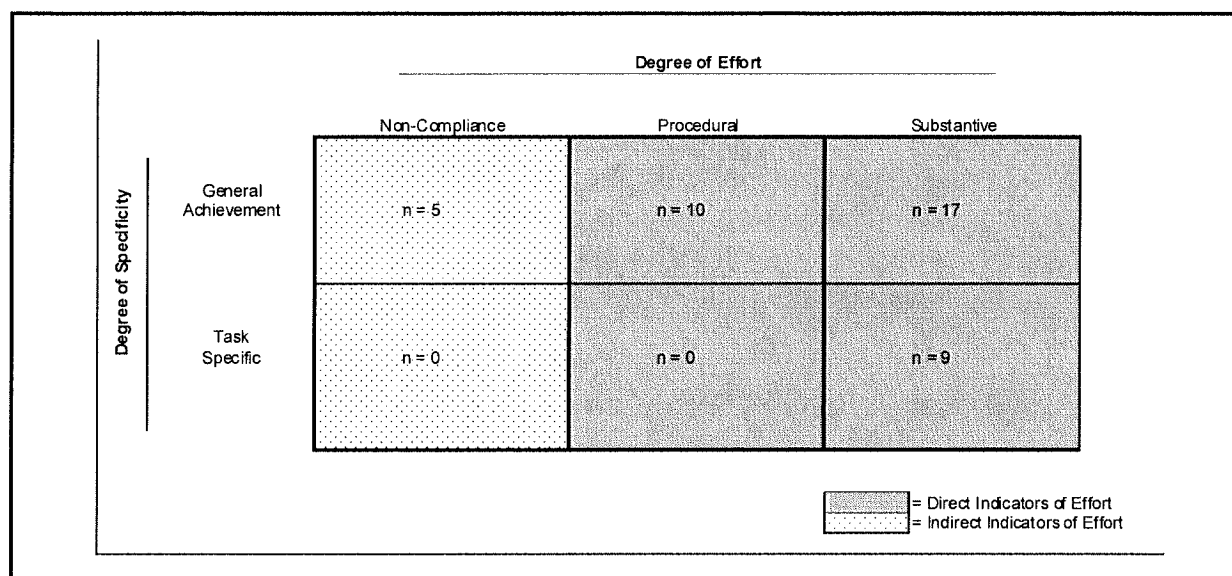
We adopt the substantive-procedural distinction used in the engagement literature because studies of effort use this distinction when discerning different forms of behavioral engagement (Alexander, Entwisle, & Horsey, 1997; Spanjers, Burns, & Wagner, 2008), thus maintaining conceptual consistency with this established literature. Substantive effort, as described earlier, is where youth take an active role in their learning, such as taking the lead on class projects, spending extra time studying for exams and quizzes, and in general, "working hard" in school. Procedural effort, also described earlier, is where youth acquiesce to school and class rules, exerting minimal adequate effort in order to function and progress through school. Examples of procedural effort include coming to class on time, completing homework assignments, and paying attention during class. While both of these express behaviors that are geared toward academic success, it should be noted that some researchers would contend that only *substantive* effort is truly effort.[1] Noncompliance, the remaining column, represents behaviors that disrupt the ability to exert effort, such as not coming to class on time, not completing homework assignments, and daydreaming during class. As evidenced in the figure, most of the measurement approaches in the articles we identified were geared toward substantive effort.

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[1] For example, Lee and Anderson (1993) contended that "students who engage in tasks in a superficial manner may be responding rationally to a situation that affords them no real opportunity for deeper understanding" (p.586). We present measures of both procedural and substantive effort for completeness.

The degree of specificity is divided into two categories: general achievement and task specific. General achievement refers to effort exerted to do well in school or in a particular class. Task specific refers to effort aimed at a particular task, assignment, or problem within class or school. While conceptually these dimensions of effort are not entirely mutually exclusive (i.e., task-specific effort can also be considered geared toward achievement in general) we treat them as mutually exclusive for ease of organization and clarity of presentation. As evidenced in Figure 2-1, most of the measurement approaches were oriented toward general achievement rather than specific tasks. We discuss each of the measurement approaches along both dimensions. However, we do not discuss noncompliant, task-specific behavior or procedural task-specific behavior because none of the articles used measures that gauge these dimensions.

2.4.1 Noncompliant General Achievement-Oriented Behaviors

Five studies used measures of noncompliance as indirect evidence of effort; that is, they assume that noncompliant behavior precludes effort. Each of these studies employed quantitative analyses of survey data where scales are created from individual items. The key features of these measures are shown in Table 2-2. Three studies focused on elementary school students. Finn et al. (1995) used a 5-item scale that asked teachers to report on the student's "inattentive behavior" over the past 2 to 3 months, such as losing, forgetting, or misplacing materials; coming to class late; and not knowing what is going on in class. Finn et al. found that these behaviors were associated with lower standardized test scores among 4th graders in Tennessee classrooms. Alexander, Entwisle, and Horsey (1997) used school records of 1st graders in the Baltimore City Public School system to determine the number of absences and the number of tardy days, which in turn were used as indirect evidence of (a lack of) effort. These behaviors were significant predictors of dropping out of high school years later. Fincham, Hokoda, and Sanders (1989) used items that more directly probed at student's lack of effort, such as teachers' reports of whether the student makes a half-hearted attempt when encountering a difficult problem and whether the student says things like "I can't do it" when having trouble with work. Lack of effort was associated with lower math and reading test scores. Because all three studies were focused on the early years of school, all of them relied on sources other than the student (e.g., teacher reports and student records).

The other two studies that used noncompliant behaviors as proxies for a lack of effort were based on the middle school years. Finn (1993) used multiple measures (both student and teacher reported) from the National Education Longitudinal Study of 1988 (NELS:88) to create a series of scales that gauge student preparedness. For example, he used questions that asked of students to report the number of times they came to class without pencil and paper, the number of times they came to class without books, and the number of times they came to class without their homework completed in order to form a scale of student preparedness. In addition to student reports, he used teacher reports of whether the students rarely complete homework, are inattentive in class, and are frequently disruptive in class to form a scale of nonengagement. Lastly, Lau and Nie (2008) used less concrete language in their questions posed to 5th graders, such as "I do not work hard in math class." They found that classrooms that emphasized social comparisons such as getting high scores and doing better than one's peers had students with lower levels of effort, while classrooms that emphasized learning and improvement had students with higher levels of effort.

Table 2-2.   Measures of Noncompliant General Achievement-Oriented Behaviors: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Absences and tardiness	School records	NA	2	1	School records of elementary school students; 790 students beginning the 1st grade in the Baltimore City Public School System	Alexander, Entwisle, & Horsey (1997)
Learned helplessness subscale of the Intellectual Achievement Responsibility (IAR) scale	Teacher	NA	10	1	Teacher-reported behaviors and evaluations of high school students; 87 3rd-grade students in the Midwest	Fincham, Hokoda, & Sanders (1989)
Withdrawn	Teacher	NA	1	2	Teacher-reported behaviors and evaluations of middle and high school students; nationally representative sample (n = 18,307)	Finn (1993) Finn & Rock (1997)
Disengagement scale	Teacher	NA	3	2	Teacher-reported behaviors and evaluations of middle and high school students; nationally representative sample (n = 18,307)	Finn (1993) Finn & Rock (1997)
Inattentive behavior scale	Teacher	NA	5	2	Teacher-reported behaviors and evaluations of elementary school students; approximately 2,000 4th-grade students in Tennessee	Finn, Pannozzo, & Voekl (1995)
Engagement scale and effort scale	Student	NA	5, 4	1	Middle school students self-reported behaviors and evaluations; 3,943 5th-grade students	Lau & Nie (2008)

2.4.2 Procedural General Achievement-Oriented Behaviors

Ten studies used measures of compliant behaviors toward general achievement as direct indicators of effort. Five of these studies focused exclusively on the elementary school years. The key features of these measures are shown in Table 2-3. Using longitudinal data on a cohort of Baltimore school children, Alexander, Entwisle, and Dauber (1993) created a scale of student interest and participation among 1st graders based on teacher reports of the students' enthusiasm and expression of ideas and found that it was negatively associated with standardized test scores later on the 4th grade. Ladd ad Birch (1997) had researchers observe three kindergarten classrooms in the Midwest and record the extent to which students accepted the teacher's authority and complied with classroom rules and responsibilities. They found that strong relationships with peers and teachers predicted effort, which in turn, predicted achievement. Valeski and Stipek (2001) used a scale of cooperative participation based on teacher reports of the extent to which children accepted the teacher's authority and behaved responsibly among three 1st-grade classrooms. They found that students who felt more competent about their math and literacy were more likely to exert effort.

Lastly, two studies used data from the Tennessee Student Teacher Achievement Ratio (STAR) project (Finn et al., 1991, 1995). Both relied on teacher reports of how often the student paid attention and turned in homework assignments on time to measure minimal adequate participation in school. Due to the age of the students, all of the studies of procedural achievement-oriented behaviors among elementary students use reports by teachers and researchers.

The remaining five studies that measured compliant, achievement-oriented behaviors focused on the middle school years and/or multiple years of school. All but one of them used scales based on student-reported measures of classroom behaviors such as paying attention (Finn & Rock, 1997; Connell et al., 1994; Marks, 2000), completing homework assignments on time (Finn & Rock, 1997; Connell et al., 1994; Marks, 2000), and participating in class discussion (Berndt & Keefe, 1995). The only one of these five to use external reports of behavior was Skinner and colleagues (1990), who studied a sample of 3rd through 6th graders in a suburban elementary school. They asked teachers to report on the frequency of student behaviors using questions such as, "When in class, does this student acts like he/she is working?" "When in class, does this student participate in class discussions?" They found that students who hold high strategy beliefs (e.g., "to do well in school, I need to do x, y, and z") and high capacity beliefs ("I have the capacity to...") exert the greatest amount of effort.

2.4.3 Substantive General Achievement-Oriented Behaviors

The most common type of measurement approach in our review was those that gathered information on behaviors that reflect an overall, self-directed investment on the part of the student to do well in school. Seventeen of the studies met these criteria. The key features of these measures are shown in Table 2-4. Except for 3, all 17 studies used questions that attempted to quantify how hard the student was working, using scales based on items that asked students to subjectively rate items such as, "I work really hard in this class" (Hardre, Crowson, Debacker, & White, 2007), and that ask teachers to subjectively rate students with questions such as, "Compared with the typical student, how hard is he/she working?" (Rudolph, Lambert, Clark, & Kurlakowsky, 2001) or to assess whether "the student does the

Table 2-3. Measures of Procedural General Achievement-Oriented Behaviors: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Interest-participation scale	Teacher	NA	5	1	Teacher-reported behaviors and evaluations of elementary school students; 790 students beginning the 1st grade in the Baltimore City Public School System	Alexander, Entwisle, & Dauber (1993)
Involvement subscale of Classroom Environment Scale by Moos and Trickett	Student	NA	6	1	Middle school students self-reported behaviors and evaluations; 297 public school students	Berndt & Keefe (1995)
Engagement in school	Student	Behavioral engagement, emotional engagement	14	1	High school students self-reported behaviors and evaluations; 2,672 students in Atlanta, Baltimore, Washington, DC, and New York	Connell, Spencer, & Aber (1994)
Behavior scale	Student	NA	3	2	Middle and high school students self-reported behaviors and evaluations; nationally representative sample (n = 18,307)	Finn & Rock (1997)
Minimal adequate effort scale	Teacher	NA	9	2	Teacher-reported behaviors and evaluations of elementary school students; approximately 2,000 4th-grade students in Tennessee	Finn et al. (1995) Finn, Folger, & Cox (1991)

Table 2-3. **Measures of Procedural General Achievement-Oriented Behaviors: Key Features (continued)**

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
School adjustment scale	Teacher	Cooperative participation and independent participation	11	1	Researcher observations of the behaviors of elementary school students; 200 kindergartners in the Midwest	Ladd & Birch (1997)
Engagement scale	Student	One item for each component: effort, attentiveness, lack of boredom in class, and completing class assignments	4	1	Student-reported behaviors and evaluations; 5th graders, 8th graders, and 10th graders attending 24 schools that have made "substantial progress in restructuring" (n = 3,699)	Marks (2000)
Student engagement and disaffection	Teacher	NA	10	1	Teacher-reported behaviors and evaluations; 200 middle school students in upstate New York	Skinner, Wellborn, & Connell (1990)
School adjustment scale	Teacher	NA	3	1	Teacher-reported behaviors and evaluations; 225 elementary school students	Valeski & Stipek (2001)

Table 2-4.   Measures of Substantive General Achievement-Oriented Behaviors: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Interest-participation scale	Teacher	NA	5	1	Teacher-reported behaviors and evaluations of elementary school students; 790 students beginning the 1st grade in the Baltimore City Public School System	Alexander et al. (1993)
Engagement behaviors	Teacher	Work habits, externalizing behaviors, adaptability	9	1	Teacher-reported behaviors and evaluations of elementary school students; 790 students beginning the 1st grade in the Baltimore City Public School System	Alexander, Entwisle, & Horsey (1997)
Involvement subscale of Classroom Environment Scale by Moos and Trickett	Student	NA	6	1	Middle school students self-reported behaviors and evaluations; 297 public school students	Berndt & Keefe (1995)
Engagement in school	Student	Behavioral engagement, emotional engagement	14	1	High school students self-reported behaviors and evaluations; 2,672 students in Atlanta, Baltimore, Washington, DC, and New York	Connell, Spencer, & Aber (1994)
Time spent on homework	Student	NA	1		High school students self-reported behaviors and evaluations; nationally representative sample of sophomores (n = 6,737)	DeLuca & Rosenbaum (2001)

Table 2-4.   Measures of Substantive General Achievement-Oriented Behaviors: Key Features (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Learned helplessness subscale of the Intellectual Achievement Responsibility (IAR) scale	Teacher	NA	10	1	Teacher-reported behaviors and evaluations of high school students; 87 3rd-grade students in the Midwest	Fincham, Hokoda, & Sanders (1989)
Behavior scale	Student	NA	3	2	Middle and high school students self-reported behaviors and evaluations; nationally representative sample (n = 18,307)	Finn & Rock (1997)
Initiative-taking scale	Teacher	NA	7	2	Teacher-reported behaviors and evaluations of elementary school students; approximately 2,000 4th-grade students in Tennessee	Finn et al. (1995) Finn, Folger, & Cox (1991)
Attendance scale	Student	NA	4	1	Middle and high school students' self-reported behaviors and evaluations; nationally representative sample (n = 18,307)	Finn (1993)

Table 2-4.   Measures of Substantive General Achievement-Oriented Behaviors: Key Features (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Academic effort scale	Teacher	NA	5	1	Teacher-reported behaviors and evaluations of elementary school students; 437 students in the Northeast	Gest, Rulison, Davidson, & Welsh (2008)
Rochester Assessment of Intellectual and Social Engagement	Student	NA	5	1	Middle school students' self-reported behaviors and evaluations; 373 middle school students in the Midwest	Kiefer & Ryan (2008)
School adjustment scale	Teacher	Cooperative participation and independent participation	11	1	Researcher observations of the behaviors of elementary school students; 200 kindergartners in the Midwest	Ladd & Birch (1997)
Task-specific effort	Student	NA	4	1	Middle school students' self-reported behaviors and evaluations; 102 African American and Latino students	Roderick & Engel (2001)

Table 2-4. **Measures of Substantive General Achievement-Oriented Behaviors: Key Features (continued)**

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Effort	Teacher	NA	1	1	Teacher-reported behaviors and evaluations; 329 middle school students in the Midwest	Rudolph, Lambert, Clark, & Kurlakowsky (2001)
Student engagement and disaffection	Teacher	NA	10	1	Teacher-reported behaviors and evaluations; 200 middle school students in upstate New York	Skinner, Wellborn, & Connell (1990)
School adjustment scale	Teacher	NA	3	1	Teacher-reported behaviors and evaluations; 225 elementary school students	Valeski & Stipek (2001)

best s/he can on their schoolwork" (Gest, Rulison, Davidson, & Welsh, 2008). Effort measured in this subjective sense was typically used as an outcome, whereby students with a range of favorable academic characteristics, such as having a positive perception of their classroom and their own ability (Hardre, Crowson, Debacker, & White, 2007), making grade transitions with their peer groups (Rudolph, Lambert, Clark, & Kurlakowsky, 2001), and keeping a peer group with a positive academic reputation (Gest, Rulison, Davidson, & Welsh, 2008), were most likely to exert effort in school.

Of these 17 studies, 3 stood out for their creative ways of quantifying the exertion of effort by inquiring about student performance when facing challenges. Interestingly, all three studies are based on physical education classes. Standage, Duda, and Ntoumanis' (2006) study of junior high students in Britain asked teachers to rate students' effort using statements such as, "the student gives up easily on tasks that are difficult or challenging" and "the student will try a new task again even if she/he was not successful the first time." Agbuga and Xiang (2008) and Guan, Xiang, McBride, and Bruene (2006) asked middle school students in Turkey and in the United States (Texas) to rate students' effort using statements such as, "when something that I am practicing is difficult, I spend extra time and effort trying to do it right" and "regardless of whether I like the activities, I work my hardest to do them." By invoking the difficulty of the challenge or class, the researcher provides a cognitive cue to the respondents to think more carefully about the behavior they are asked to evaluate. All three of these studies used effort as their outcome and found that motivation (Standage, Duda, & Ntoumanis, 2006), performance goals (Agbuga & Xiang, 2008), and performance expectations (Xiang, McBride, & Bruene, 2006) were all significant predictors.

The three studies that did not subjectively inquire about "hard work" instead used "time spent on homework" as a more concrete, performance-based indicator of active participation in school work (DeLuca & Rosenbaum, 2001; Finn, 1993). DeLuca and Rosenbaum (2001) contended that "time spent on homework is a report of actual behavior, which may contribute to academic skills...that effort may indicate a capacity for perseverance that will be useful when college presents difficulties." Both used NELS:88, a nationally representative data set, to show that time spent on homework was a positive predictor of college enrollment (DeLuca & Rosenbaum, 2001) and of standardized test performance (Finn, 1993). Though more specific in terms of quantity, this measure lacks an indication of the degree of challenge, because not all homework assignments are demanding and, in some cases, a long time spent on homework can indicate learning difficulties rather than effort.

2.4.4 Substantive Task-Oriented Behaviors

The last type of measurement approach we reviewed was one that gauged behaviors reflecting the initiation of activities and the expansion of thinking beyond the necessary requirements to complete a problem or a task. Nine studies used measures that met these criteria. The key features of these measures are shown in Table 2-5. Similar to the handful of items used to measure substantive achievement-oriented behaviors (described in the previous section), four of the studies here used items that asked respondents to subjectively rate the degree of hard work exerted in performing the task at hand. For example, Ainley, Enger, and Kennedy (2008) administered writing tasks of varying difficulty to high school students and had them rate their effort by asking, "Did you need to put in a lot of effort to stay focused?" Similarly, Shernoff and Vandell (2007) evaluated the efficacy of after-school enrichment programs by asking

Table 2-5. **Measures of Substantive Task-Oriented Behaviors: Key Features**

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Post-task reflection	Student	One item for each construct: challenge, skill, absorption, timelessness, and effort	5	1	High school and college students' self-reported behaviors and evaluations; n = 45	Ainley, Enger, & Kennedy (2008)
Motivational intention questions for effort	Student	NA	11	1	Middle and high school students' self-reported behaviors and evaluations; 289 public school students in the Midwest	Chase (2001)
Task-directed scale	Researcher observation	NA	4	1	Researcher observations of the behaviors of preschool and elementary school students; 43 toddlers in Australia	Gilmore, Cuskelly, & Purdie (2003)
Task engagement	Researcher observation	NA	NA	1	Researcher observations of the behaviors of middle school students; 12 kindergartners in the Midwest	Lee & Anderson (1993)
Task-specific effort	Student	NA	4	1	Middle school students' self-reported behaviors and evaluations; 102 African American and Latino students	Roderick & Engel (2001)

Table 2-5.   Measures of Substantive Task-Oriented Behaviors: Key Features (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
"Flow" scale via experience sampling method	Student	NA	3	1	Middle school students' self-reported behaviors and evaluations; 165 8th-grade students in the Midwest	Shernoff & Vandell (2007)
Effort and Persistence in Learning subscale of the Student Approaches to Learning Survey	Student	NA	4	1	Elementary school students' self-reported behaviors and evaluations; 125 elementary school students in Minnesota	Spanjers, Burns, & Wagner (2008)
Number of laps	Student	NA	1	2		Xiang & Bruene (2004)
Number of laps	Student	NA	1	2		Xiang, McBride, & Bruene (2006)

participants (via experience sampling method procedures) to identify the activities they were currently doing and to note how hard they were concentrating. The former study used students' measure of effort to identify those students who were exhibiting "flow" (i.e., high rate on task absorption and low rate on effort), while the latter study detected a positive relationship between participation in a sports/arts enrichment program and effort.

Two studies used performance-based indicators of effort rather than subjective self-evaluations. Both are authored by Xiang and colleagues (2004, 2006) and both evaluated a physical education program in Texas where elementary school children were required to run/walk once a week as part of their regularly scheduled gym class. They operationalized effort in terms of the number of laps completed through the course of the year: "Effort refers to overall effort expended during the program. When children tried to run/walk as many laps as possible during the school year…they had to overcome physical and psychological difficulties and be willing to push themselves" (Xiang, Bruene, & McBride, 2004, p. 222). Students who expressed mastery goals expected to do well were most likely to exert effort on this task. As with the measure of time spent on homework discussed in the previous section, this performance-based measure lacks an indication of the degree of challenge because not all youth have the same ability to run long distances. In other words, 35 laps could be an easy task for an athletically inclined student, whereas 20 laps could represent intense effort for a less athletically inclined student. None of these students linked performance in physical education with performance in academic courses.

In addition to subjective evaluations and performance-based indicators of substantive task-oriented effort, the final three studies appraised the exertion of effort by identifying whether students are task directed or non–task directed while they are in the process of completing the task.[2] Gilmore and colleagues (2003) had 43 2-year-olds and 8-year-olds in Australia each complete two structured mastery tasks, jigsaw-type puzzles for the former and concentration-style games for the latter. Researchers observed these mastery activities, each lasting 4 minutes, and classified the youths' performance at every 15-second interval as either task directed or non–task directed. They found that task-directed behavior was not correlated with the child's cognitive ability.

Spanjers, Burns, and Wagner (2008) recruited a sample of 125 3rd- and 4th-grade students in Minnesota to complete a reading comprehension exercise. While they were doing this, researchers observed and coded their "time-on-task" behavior, looking for indicators of off-task behavior such as gazing away from the reading passages and leaving their seat for nonrelevant reasons. Additionally, they directly asked the students to assess how hard they worked based on a scale that included items such as, "I worked as hard as possible" and "I kept working even when it was hard." Interestingly, the correlation between the researchers' observations and the student reports were nonsignificant in the 3rd grade and significant but small in the 4th grade, suggesting that the source of the measure may affect its measurement properties.

Lastly, Lee and Anderson (1993) observed two 6th-grade classrooms in the Midwest and interviewed 12 students using a semistructured approach to probe into their cognitive and metacognitive

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[2] There was no information provided regarding the criteria used to identify task-directed or non–task-directed performance.

processes while the students were actually engaged in classroom tasks in a lesson on matter and molecules. They recorded the students' behavioral responses throughout the lesson, which allowed the researchers to parse out procedural behaviors from substantive ones. Specifically, they were able to identify what they termed "self-initiated cognitive engagement" among students. These were students who were "initiating activities to understand science better without solicitation from the teacher, expanding their thinking beyond the lesson content, and engaging in tasks beyond the requirements or expectations of the classroom" (Lee & Anderson, 1993, p. 590). They found that students who valued science were those who were most likely to engage.

2.5   Studies of Effort and School Performance, 1997–2008

In most of the analyses reviewed, effort was used as a predictor in only seven articles and used as both an outcome and a predictor in six articles (n = 13). Furthermore, 5 of these 13 used cross-sectional designs, precluding the establishment of causality. Hence, generalizations about relationships with various educational outcomes at different stages of schooling are limited. In other words, it is not possible to discern from this review whether effort has more bearing on academic success in the elementary school years, in middle school, in high school, or whether it has consistent efficacy throughout. However, what does stand out in this handful of articles is the strong relationship between effort at *earlier* stages and academic success at *later* stages. For example, Fincham et al.'s (1989) study of Midwestern elementary school children found that noncompliant behaviors in the 4th grade were associated with achievement tests scores in the 5th grade. Similarly, Alexander et al.'s (1993) study of Baltimore public school students found that general achievement-oriented behaviors in the 1st grade predicted achievement in the 4th grade. Fincham et al.'s (1989) study documented significant relationships with the independent and dependent variables measured 2 years apart, while Alexander et al.'s (1993) study documented a 3-year interval.

One of the more compelling findings is based on Alexander et al.'s (1997) analysis of the same cohort of Baltimore students in which they found that engagement behaviors in the 1st grade predicted the odds of dropping out in high school, with nearly a decade separating the measurement of the independent and dependent variables. These findings underscore the developmental linkages between effort and school success at different stages of schooling. While students may not always exert effort in every task they encounter, their performance of standardized tests and their persistence in school appears to be part of a sustained pattern of effort and engagement more generally.

2.6   Discussion

As evidenced in the small number of articles that were deemed adequate for this review (32 articles out of an initial pool of over 3,000), the measurement of effort does not a have a well-established base on which to draw. However, in highlighting the key dimensions of the concept, as well as their corresponding measurement approaches, we identified three issues that should be considered when either developing items to gauge effort or when evaluating empirical evidence that use existing indicators. These include choosing between general achievement and task-specific behaviors; disentangling procedural from substantive behaviors; and examining the relative utility of subjective and performance-based indicators. We briefly discuss each of these below.

Though not evident in any one particular article, the distinction between general achievement and task-specific behaviors could have major implications for the conclusions drawn from any particular study. Because the school day is divided into segments of activities ranging from differences in content across the day, such as art class versus math class, to differences in teaching approach within courses, such as lecture versus group activities, the measure needs to be context sensitive. Large-scale surveys that use achievement-oriented questions such as, "How hard do you work in school?" or "How hard do you work in math class?" could easily conflate differences in effort across classes and within-class activities, and in turn obscure within-student variation in the exertion of effort. It is understandable that cost constraints force large-scale studies to focus on the general rather than the specific, however this needs to be acknowledged when drawing conclusions from analyses that use achievement-oriented measures. Conversely, effort on individual tasks (i.e., working hard on a science problem) should not be interpreted as more general effort (i.e., working hard in science courses)—particularly because participants in research studies that track individual tasks will often try to present a positive appearance toward outside observers.

The next consideration is the use of procedural and substantive indicators of effort. As alluded to earlier, there is some dissent on whether procedural effort is "truly" considered effort. In reviewing the specifics of each individual measure, we saw a number of instances where both forms of effort were used to form a single scale. While this is analytically convenient, it hides the multifaceted ways students engage in school and, in some cases, could lead to misleading results. We therefore recommend using items that measure both types of effort. A useful example of this is Finn, Pannozzo, and Voekl's (1995) analysis of 4th-grade achievement. They created separate scales for minimally adequate effort and for initiative taking. This allowed them to explore the unique contributions of both dimensions of effort. Having both sets of measures on hand provides a firmer foundation for evaluating the effects of effort on student initiative and motivation, which is crucial information for those concerned with student (dis)engagement.

Lastly, this review examined multiple indicators, but very few of them in tandem. We noticed that a large number used self-evaluations of effort using items such as, "I work really hard in this class." The "built-in" subjectivity makes comparisons less convincing because a quantifiable interpretation is not possible. Conversely, as mentioned earlier, performance indicators on their own are less than optimal because ability on any given task is not uniform across the population. The one study that used performance-based indicators alongside subjective indicators found little to no relationship between the two. Though taken from only one study, this finding does question the sole reliance on subjective indicators, which appears to be the norm in this line of research. The use of both performance-based and subjective indicators will allow researchers to assess the reliability and validity of these measures, as well as provide information on which ones are best suited to the research topic at hand. Furthermore, having these separate measures at various stages of schooling (along with achievement indicators) will provide more evidence to evaluate the strength of the linkages between effort at earlier ages and success at later ages documented in this review.

2.7   References

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Self-Regulation

Author: Jean Lennon

3.1 Introduction

To understand differences in levels of performance between students that cannot always be explained by inherent ability, researchers have developed the concept of self-regulation. Self-regulation is a multifaceted process by which students evaluate tasks, review the strategies available to them for accomplishing the tasks, apply themselves to completing the tasks, and, depending on outcomes, revise their model for approaching similar tasks in the future. The field of self-regulation is several decades old, with researchers from each theoretical domain approaching self-regulation slightly differently. The predominant view of self-regulation, however, is social cognitive theory, which takes into account factors in the student's environment, such as interaction with teacher and peers.

In the following sections, we review models of academic self-regulation and briefly discuss how self-regulation is related to other noncognitive skills. We will then review different measurement approaches in the field of self-regulation research, as well as findings from the empirical studies reviewed.

3.2 Methods

The first task involved scanning the literature to identify recent publications on self-regulation. Search terms included "self-regulation," "self-regulated learning," and "self-regulation" in combination with "academic," "achievement," "predict," and "measure." We then limited those articles to empirical research that either discussed ways of measuring the construct, used the construct as a predictor of academic achievement, or both. In these articles, student self-regulation had to be measured any time before high school graduation. Study outcomes included academic outcomes of grades, test scores, attendance, promotion, and school completion. Although postsecondary attendance and attainment could be the outcomes of the study, the initial measurement of self-regulation had to occur earlier. Studies addressing only nonacademic outcomes, such as depression or psychological distress, were excluded. This approach yielded 17 articles for this review.

3.3 Conceptual Definition

3.3.1 Definitions of Self-Regulation

Self-regulation is the recognition of a student's own role in his or her learning and performance. Broadly speaking, self-regulated learning (SRL) refers to "proactive processes that students use to acquire academic skill, such as setting goals, selecting and deploying strategies, and self-monitoring one's effectiveness, rather than as a reactive event that happens to students due to impersonal forces" (Zimmerman, 2008, pp.166–167). Self-regulated students are metacognitively, motivationally, and

behaviorally active participants in their own learning processes (Zimmerman, 1989). Self-regulation is conceptualized differently depending upon theoretical orientation, but the predominant view in current research seems to be a sociocognitive conceptualization, in which factors in the student's setting affect the student's beliefs, values, expectations, and actions (Schunk & Zimmerman, 1997).

There is a tremendous amount of interest in self-regulation, but the boundaries of the concept remain fuzzy. Self-regulation can refer to cognitive, emotional, or behavioral control, including metacognitive strategies, such as comprehension monitoring; effort management strategies, such as persistence and diligence; and behavioral strategies, such as controlling the impulse to talk during class. Because so many psychological processes are believed to be involved in self-regulation, this skill, or set of skills, has significant overlap with many other constructs, as will be discussed below in Section 3.2. Self-regulation also seems to develop with age, so that secondary and college students' behavioral regulation involves "goal setting, planning, self-monitoring, and asking for help when needed," while younger children's behavioral self-regulation may be characterized by "approach/withdrawal, distractibility, and persistence" (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003, p.102).

Zimmerman (2001) provided an overview of features common to most definitions of self-regulation. First is that students are aware of their self-regulatory processes and how these can be used to improve their academic achievements. Second is that there is a self-oriented feedback loop during learning. Students monitor the effectiveness of their methods or strategies, which results in covert changes in self-perception (in phenomenological theories) or overt changes in behavior (in operant theories). The third feature common to theories of self-regulation is that self-regulation has a motivational component. SRL requires effort, time, and vigilance, so it follows that a student must be motivated in some way before self-regulation can take place.

The components of SRL investigated by recent studies vary significantly. In their investigations of SRL, the studies reviewed included measures of motivation, learning strategies, self-concept, metacognition, behavior, learning-related skills, and false belief. This variety of constructs suggests that there exists some debate as to the components of SRL. The number of subdomains listed across measures reveals that, when researchers are talking about SRL from study to study, sometimes they are including totally different aspects of cognition. This is a major challenge for the field.

Two prominent models of SRL are those described by Winne and Hadwin (1998) and Zimmerman (2008). Winne and Hadwin's model of SRL described four distinct phases. In the first phase, the student's task perceptions are defined, which involves an assessment of task conditions and takes into consideration the student's own cognitive conditions. In the second phase, the student sets task-related goals and plans how to achieve those goals using tactics, or bundles of memories of conditional knowledge and cognitive operations. In the third phase, the tactics selected in the second phase are enacted. Finally, the fourth phase, which does not always occur, includes changing those parts of the SRL model for which the student has conscious control.

Zimmerman's (2008) model of SRL has three cyclical phases, corresponding to before, during, and after SRL takes place. The forethought phase is broken into two components: task analysis and self-motivation beliefs. In this phase, motivational factors such as self-efficacy and task interest combine with

the task analysis activities of goal setting and strategic planning. Performance is the second phase, which is characterized by self-control and self-observation. At the conclusion of the SRL event is the self-reflection phase, wherein self-judgment and self-reaction may or may not lead to changes in the variables that make up the forethought phase for subsequent SRL events. As with Winne and Hadwin's model, Zimmerman's includes self-monitoring during task performance and a potential phase of self-review. One challenge for SRL research is accessing and tracking the many variables that seem to be at play in these processes.

3.3.2 Relation of Self-Regulation and Other Noncognitive Skills

As noted in Section 3.2, the definition of self-regulation can vary according to a researcher's theoretical orientation and what aspect of self-regulation is under examination. Additionally, self-regulation is sometimes even defined in terms of other noncognitive constructs, such as motivation, self-efficacy, task interest, and achievement goals (e.g., Cleary, 2006). SRL is most frequently discussed in relation to motivation. Motivation is a highly correlated noncognitive skill and most researchers would argue is an integral component of self-regulation. Lange, Farran, and Boyles (1999) reported a study based on teacher ratings of general motivational tendencies and self-regulatory behaviors in prekindergarten programs. They found that self-regulatory ratings were predictive of early achievement scores more consistently than were the motivational ratings alone. "Unfortunately, disentangling the constructs of motivation and self-regulation has proven challenging. Underachievers may lack motivation, self-regulation skills, or a combination of the two traits" (McCoach, 2000, p.7).

Another noncognitive skill associated with self-regulation is self-efficacy, or the student's belief that he or she has the skills to complete a specific task. Research has shown that the use of self-regulated strategies increases self-efficacy and, in turn, intrinsically motivates individuals to continue to self-regulate (Wolters et al., 1996).

3.4 Measures of Self-Regulation

As with many of the noncognitive skills discussed in this report, self-regulation is difficult to observe. Many measurement approaches rely on students to report whether and how they are engaging in self-regulation, so the very act of measuring self-regulation intervenes in the student's learning environment and may affect the skill being investigated. Reliance on self-report also limits what can be learned about self-regulation in younger children, who are not as able to articulate their mental processes. At those ages, SRL research depends more heavily on parent and teacher ratings of those observable behaviors that are assumed to be indicative of psychological events relevant to self-regulation. This methodological limitation may hamper or alter researchers' understandings of the early components and processes that are part of SRL. This section gives an overview of the number and types of measures currently at use in the field. Table 3-1 lists SRL measures and some of their key features.

3.4.1 Measuring Self-Regulated Learning as an Aptitude

Winne and Perry (2000) described SRL as either an aptitude or an event. When SRL is seen as an aptitude, it is abstracted over multiple self-regulation events and measurement formats. SRL may be measured using questionnaires, structured interviews, and parent or teacher ratings. SRL as an aptitude is

found to vary within individuals over time, across tasks and settings, and across individuals, which raises the question of whether it is stable enough to be called an aptitude, or trait.

Self-Report Questionnaires

Self-report questionnaires are prevalent because of their convenience, low cost, and simplicity. SRL self-report questionnaires usually ask students to generalize across learning experiences and may be administered in concert with or separate from SRL tasks. In this review of the literature, no single self-report questionnaire was found to be used with much greater frequency than any other (see Table 3-1). Ten self-report measures were identified, and none of these was used in more than one study. This variety of measures suggests that researchers are still struggling to define SRL sufficiently or that there are multiple types of SRL, each of which requires a different set of questionnaire items.

As noted above, younger students will not be able to respond to self-report questionnaires because of literacy requirements, as well as the metacognitive demands inherent in such instruments. Accordingly, studies that used self-report measures started around the beginning of middle school. Studies of children younger than this relied on parent or teacher ratings, or observational measures.

Structured Interviews

This type of SRL measure consists of a highly structured set of specific items, often with skip patterns determined by students' responses. Structured interviews are different from think-aloud procedures (described below) because they do not take place during a specific learning task. An example of structured interviews for SRL is the Self-regulated Learning Interview Schedule (SRLIS) (Zimmerman & Martinez-Pons, 1986). One challenge to working with structured interviews is the need to train coders to score the content.

3.4.2 Measuring Self-Regulated Learning as an Event

When SRL is seen as an event, it is a more localized phenomenon that is defined with a beginning and end point in time. Measures of SRL as an event include think-aloud measures, error detection tasks, trace methodologies, and observations.

Think-Aloud Measures

Think-aloud measures vary in how structured they are, but all of these ask students to report verbally on their cognitive processes while they are engaged in a specific learning task. Researchers rely on think-aloud protocols to help them map out models of SRL. As with self-report questionnaires, these measures are not likely to be as well suited for use with younger populations who may have insufficient vocabulary to communicate their mental processes.

Error Detection Tasks

This type of SRL measure is designed to introduce errors into task materials and then observe whether students detect the errors, and if so, how students proceed. Students may or may not be told beforehand that there are errors present, and their detection of the errors may be measured by asking them to mark the errors found, or by eye fixations, which assume students will attend longer to errors than other task features.

Table 3-1. Measures of Self-Regulation: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Peg-tapping measure of inhibitory control; item selection measure of attention shifting; unexpected contents and changed locations tasks	Observation			1	3- to 5-year-olds	Blair & Razza (2007)
Children's Behavior Questionnaire	Teacher, parent	Anger, approach, attention, and inhibitory control	Not reported	1	3- to 5-year-olds	Blair & Razza (2007)
Strategic Flexibility Questionnaire (SFQ)	Self-report	Adaptiveness, inflexibility, and irresoluteness in self-regulatory control	21	1	10th-grade, private school students reported	Cantwell (1998)
Survey of Learning Behaviors (SLB)	Self-report	Self-regulation: self-monitoring subscale; Self-regulation: knowledge acquisition subscale, self-efficacy scale	13,9,7	1	Participants ages 15 to 22 completed questionnaire	Chularut & DeBacker (2004)
Self-Regulation Strategy Inventory—Self-Report (SRSI-SR)	Self-report		45	1	9th and 10th graders completed survey	Cleary (2006)
Self-Regulatory Skills Measurement Questionnaire (SRSMQ)	Self-report		33	1	Self-reported by 37 6th and 7th graders	Eom & Reiser (2000)
Self-Regulation Test for Children (SRTC)	Self-report	NA	Task oriented	1	5- to 8-year-olds	Howse, Lange, Farran & Boyles (2003)
Instrumental Competence Scale for Children (COMPSCALE)	Teacher	Motivation, behavior	18	2	5- to 8-year-olds	Howse, Calkins, Anastopoulos, Keane, & Shelton (2003)
The Emotion Regulation Checklist	Parent	Negativity/Liability scale, Emotion Regulation scale	24	1		Howse, Calkins, Anastopoulos, Keane, & Shelton (2003)
Laboratory Assessment of Temperament - Preschool Edition	Observation	Frustration	2	1	Preschool	Howse, Calkins, Anastopoulos, Keane, & Shelton (2003)

Table 3-1. Measures of Self-Regulation: Key Features (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Control, Agency, and Means–Ends Interview (CAMI)	Self-report	Agency subscales for effort and ability	12	1	Self-reported beliefs by 8- to 11-year-olds	Lopez et al. (1998)
State Measurement Scale	Self-report	Awareness, self-checking, planning, cognitive strategy use, and effort	Not specified	1	Self-reported beliefs by 10th through 12th graders	Malpass, O'Neil, & Hocevar (1999)
Cooper-Farran Behavioral Rating Scales	Teacher	Work-related subscale	16	1	Kindergarten	McClelland, Acock, & Morrison (2006)
School Attitude Assessment Survey (SAAS)	Self-report	NA	51	1	Self-reported beliefs by middle and high school students	McCoach (2000)
Self-Regulated Learning Interview Schedule (SRLIS)	Self-report	Motivation, metacognitive, behavioral	6	2	Face-to-face interviews with high school students	Nota, Soresi, & Zimmerman (2004)
Motivation Strategies for Learning Questionnaire (MSLQ)	Self-report	Learning strategies, motivation	81	1	761 5th- and 6th-grade students reported	Shores & Shannon (2007)
Cognitive Assessment System	Observation	Visual Search, Crack-the-Code	Task oriented	1	Task-oriented assessment for 6th graders	Sink et al. (1991)
Individually designed experiment to measure self-regulated learning	Observation		not reported	1	Middle and high school students	Sink et al. (1991)
Self-Regulated Learning Questionnaire (SRLQ)	Self-report	Self-concept, motivation, learning strategies	45	1	Self-reported by 8th graders	Swalander & Taube (2007)

Table 3-1.   Measures of Self-Regulation: Key Features (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Learning and Study Strategies Inventory (LASSI)	Self-report	Skill scales (concentration, selecting main ideas, information processing), will scales (motivation, attitude, anxiety), self-regulation scales (time management, study aids, self-testing, test strategies)	80	1		Swalander & Taube (2007)

Trace Methodologies

Traces are "observable indicators about cognition that students create as they engage with a task" (Winne & Perry, 2000, p.551), for example, highlighting errors found in a text. Trace methods are still developing, and rely on the specific model of cognition being tested.

Observations

Observational measures of SRL provide advantages over some other methods because they collect information on the context of the student's behavior, and they can be used with even the youngest students. Observation data are sometimes supplemented with student interviews or quantitative data collected through self-report measures or student records.

3.5 Studies of Self-Regulation and School Performance, 1997–2008

Self-regulation is thought to be relevant for understanding academic outcomes because it refers to a student's ability to marshal individual resources toward achieving academic goals. Students who can focus on tasks and apply cognitive strategies to solving problems will be more successful in school than students who cannot or do not. Students across a broad range of ages can be taught to self-regulate, and academic performance can increase as a result. This section describes recent empirical findings related to self-regulation and academic performance, with an emphasis on how SRL was measured. We discuss some indicators of how rigorous the studies were, including sample characteristics, whether the study could be replicated, and analytic considerations. Table 3-2 summarizes key methodological features of the studies reviewed.

As Zimmerman (2008) summarized, self-regulation research began in earnest in the 1970s and 1980s. During this initial period, research "focused on the impact of individual self-regulatory processes, such as strategy use, goal setting, imagery, or self-instruction" (p.167). But findings failed to explain why students seldom used SRL spontaneously (i.e., outside of experimental settings). It followed that there must be other parts of SRL not yet accounted for that would explain the motivational aspects.

During the 1980s, researchers crystallized an expanded model of SRL through development of a number of instruments that included metacognitive, motivational, and behavioral assessments. These included the Learning and Study Strategies Inventory (LASSI) (Weinstein, Schulte, & Palmer, 1987), a self-report measure of 10 subscales and 80 items; the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1993), another self-report measure consisting of 81 items and two major subscales; and the Self-regulated Learning Interview Scale SRLIS (Zimmerman & Martinez-Pons, 1986), in which students' open-ended responses to six problem contexts are coded into 14 self-regulatory categories that reflect the metacognitive, motivational, and behavioral components. (Refer to Section 3.3.1 for more information on self-report measures of SRL.) Additionally, a variety of observational measures have been developed, especially for use in younger samples.

Table 3-2.   Approaches to Studies of Self-Regulation

Study Approach	Count of Studies Using This Approach
Can study be replicated?	
Data and survey are available	16
Questionnaire is available	0
No, neither data nor survey are available	1
Is sample generalizable?	
Sample of convenience (an existing intervention program)	17
Students identified as at-risk	2
Within school	0
Within district or region	0
Nationally representative	0
What is the method of analysis?	
Case study	0
Bivariate	2
Multivariate	10
Multilevel	5
What is the time frame of the study?	
Cross-sectional	12
Longitudinal	5
At what grade level is the construct measured?	
Preschool	2
Elementary	4
Middle	4
High	3
Multiple	4
What is the source of information?	
Student report	12
Teacher report	4
Parent report	2
Researcher observation	3

3.5.1 Distribution of Study Types

Of the 17 empirical studies, only 5 were longitudinal; the other 12 were cross-sectional. Four of the longitudinal studies were done with preschool to kindergarten samples. Only one longitudinal study extended beyond this age range to follow sample members from kindergarten through 6th grade. This suggests that the strongest recent evidence for whether and how SRL affects academic outcomes is found during early elementary school.

3.5.2 Distribution of Samples

Sample size and age also varied a great deal. The smallest sample had 37 6th- and 7th-grader students; the largest sample contained 3,760 students in grades 4 through 11. Sample members were preschool aged in two of the studies, in elementary school in four of the studies, in middle school in four of the studies, in high school in four of the studies, and in some combination of these levels in three of the studies. None of the samples was representative on the national or even state level.

3.5.3   Distribution of Measures

In spite of the maturation of the field over the past two decades, a standard for measurement of SRL does not seem to have emerged. Across the 17 studies, 20 measures of SRL were used. Often times, multiple measures were used in a single study, such as, an observational measure of a kindergartener performing a challenging task and teacher ratings of regularly observed SRL behaviors. Most of the measures (12) were self-report, 6 were parent or teacher ratings, and 3 were observational. As expected, the measures used corresponded with the age of the students in the sample. In early elementary studies, observational and teacher/parent rating measures were used. Starting around the beginning of middle school, there was a heavier reliance on self-report measures.

3.5.4   Distribution of Outcomes

Most studies looked at self-regulation in relation to math (6), reading (3), or other (4) exams. Three looked at end-of-year grades. Three studies did not include outcome measures because their focus was on SRL measure development. When exams were used as outcome measures, they were most often standardized assessments, such as the Test of Early Reading Ability (TERA) or the Peabody Individual Achievement Test (PIAT).

3.5.5   Preschool and Elementary-Age Self-Regulation Studies

Given that the only longitudinal studies reviewed looked at preschool and kindergarten children, perhaps the strongest evidence for relationships between SRL and academic outcomes is found at elementary school ages. Blair and Razza (2007) looked at the role of self-regulation in emerging math and literacy skills in 141 low-income preschool and kindergarten children. They were interested in looking at several aspects of self-regulation: effortful control, executive function, and false belief. Effortful control focuses "on automatic or nonconscious aspects of emotional reactivity and regulation," while executive function focuses on "volitional control of cognitive self-regulatory processes" (p. 648). False belief, or the understanding "that one may hold and act on beliefs that are false" (p. 648), is part of theory of mind, which develops between the ages of 3 and 5 and is thought to be a central component of socioemotional self-regulation.

Measures included direct child assessments of receptive vocabulary, nonverbal intelligence, early academic measures, attention-shifting and impulse-control measures of executive function, false-belief measures, parent and teacher reports of child temperament, and teacher reports of child classroom behavior. Results showed that executive function accounted for unique variance in math ability, but less so with emerging literacy. The authors cautioned that the verbal tasks may not have required as much self-regulation as earlier literacy skills (e.g., learning to recognize letters) may require. One other finding of note was that, while teacher ratings of effortful control were found to significantly correlate with academic skills (e.g., for math, $r = .39, p < .01$), parent ratings were not significantly related.

In another study that bridged the gap between preschool and kindergarten, Howse, Lange, Farran, and Boyles (2003) examined the roles of behavioral and emotional self-regulation separately. Emotion regulation, defined as "efforts on the part of the individual to manage, modulate, inhibit, and enhance emotions" (p. 103), had not been examined before in relation to academic achievement. About 120 preschool-aged children were observed performing a number of emotion-regulation tasks meant to elicit

frustration in a laboratory setting. Responses were coded for three emotional-reactivity variables: latency to frustration, duration of frustration, and intensity of frustration. Parents completed the Emotional Regulation Checklist (Shields & Cicchetti, 1998) as a measure of children's emotion-regulation skills. At kindergarten, children's IQ was measured early in the year, and academic skills were assessed at the end of the year. Additionally, teachers rated behavioral self-regulation at the end of kindergarten using a subset of items from the Instrumental Competence Scale for Children) (Adler & Lange, 1997).

The authors reported that parents' ratings of children's emotion regulation at preschool was directly related to children's kindergarten achievement scores, but that this relationship was mediated by children's behavioral self-regulation at kindergarten. Emotion regulation is important for acquisition of academic skills because "children who have difficulty with frustration or maintaining a good mood may also have difficulty focusing their attention, planning and finishing tasks, and regulating other achievement-related behaviors" (p. 115).

Ladd, Birch, and Buhs (1999) followed about 200 students through their kindergarten year. Teacher ratings of self-regulation and emotionality early in the year predicted teacher and classmate relationships by midyear. These ratings also predicted end-of-year achievement test performance, so that students with poorly regulated emotions and behavior early in the year scored lower than their better-regulated peers.

McClelland, Acock, and Morrison (2006) provided the strongest evidence of a longitudinal relationship between self-regulation and academic achievement in reading and math. They studied 538 children between kindergarten and 6th grade to understand how variations between children in their learning-related skills (including self-regulation) explained (1) differences between children's initial academic achievement and (2) differences between children's growth in academic achievement. In this sense, the analysis examined both cross-sectional and longitudinal relationships. Learning-related skills were measured using the 16-item work-related skills subscale of the teacher-rated Cooper-Farran Behavioral Rating Scales (CFBRS). This subscale assessed children's self-regulation, responsibility, independence, and cooperation.

There are two chief limitations of the McClelland et al. (2006) study for the purposes of this review. First, there was significant sample attrition between kindergarten and 6th grade, from 538 to 260 students. While a statistical method (full information maximum likelihood) was used to address this decrease, there is likely still some bias remaining because of nonrandom dropout. It is probable that those with poorer academic skills were more likely to drop out of the sample. This reduction in the variance of self-learning skills and academic achievement in later grades would probably lead to an underestimation of the relationship between the two. The second limitation is that the work-related skills subscale of the CFBRS reflected variance in a number of factors besides self-regulation, and so it is not possible to say for certain what part of the relationships observed applies to self-regulation.

3.5.6 Middle and High School Self-Regulation Studies

Eight of the studies reviewed sampled middle and high school students—four studies in each age range and one study that sampled both. All of these studies were cross-sectional in design. Therefore,

there is not a substantial evidence base to inform how measures should be designed , which key components should be included, and how self-regulation may change in these older student populations.

Of the five middle school studies, two had moderately small sample sizes (fewer than 100 students) and three had larger samples (between 500 and 1,000 students). One study tested the reliability of a measure, so no academic outcomes were reported; the other four studies linked self-regulation with math exams, grades, and other exams. All five used different self-report measures of SRL, again illustrating that this field of research is still struggling to develop a widely accepted assessment of SRL. It should be noted that all of these SRL measures were intended to measure a general underlying SRL. The diversity of measures cannot be explained by studies examining a variety of domain-specific self-regulations. Therefore, this is one area for future research, as discussed below in Section 3.4.

All three high school studies had sample sizes of between 100 and 150 students. Two of the studies looked at 9th and 10th graders; the third study looked at 10th through 12th graders. All three used different self-report measures to collect self-regulation data, and outcomes included math exams and grades. Overall, this set of studies is not as strong as the ones found for early elementary grades. One focused on measure development, so it did not inform our understanding of how SRL relates to academic achievement. Another limitation of these studies was the generalizability of their samples. Malpass, O'Neil, and Hocevar (1999) used gifted students, and their measures were modified versions they created for their research, further limiting the generalizability of the results. Cantwell's (1998) sample was limited to approximately 150 private-school 9th- and 10th-grade students.

3.6 Discussion

While SRL research is prominent in today's educational settings, it suffers from a number of measurement issues. The sheer number of measures being used makes it difficult to compare results across studies, and confounds efforts to further refine a model of SRL. Behavioral, emotional, and cognitive self-regulation all likely play a role in influencing a student's learning and performance; however, to date, the relationship of each of these to outcomes has not been specified satisfactorily. Our understanding of SRL is also complicated by differences in measurement mode by age. In younger populations, observational measures are used; in older students, self-report measures are used. There are undoubtedly mode effects that cloud similarities and differences in SRL over the course of development.

Still, there are several promising directions for SRL research. One is an increase in the number of longitudinal studies, especially at the middle and high school levels. Causal information is lacking in the field of SRL research, and longitudinal analyses could help fill that gap. Also, as Cantwell (1998) hypothesized, there could be developmental changes in SRL—a "crystallization" of related processes— and our understanding of the development of the self-regulated student would benefit from research during these years. Another area in which SRL should expand is in the direction of domain-specific models of SRL. As with self-efficacy, it may be that self-regulation is subject specific, due to variations in motivation or past experiences with a certain type of task. Zimmerman (2008) also described trace methods whereby researchers may find evidence, or traces, of the SRL processes used during a specific task. These traces would contribute to the literature by lessening researchers' reliance on observational and self-report measures, both of which may suffer from a reporting bias.

3.7   References

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Self-Efficacy

Author: Jean Lennon

4.1 Introduction

Since its introduction by Bandura in 1977, the concept of self-efficacy has been a major focus of theoretical and empirical scholarship. This theoretical construct was one of many that signaled a significant departure from behaviorist schools of thought, which dominated behavioral science for decades. Variations in performance could now be attributed, in part, to differences among people in their beliefs and perceptions about their ability, rather than differences among people in their reinforcement histories. Research on child development has incorporated constructs such as self-efficacy into studies examining children's physical, social, and academic achievements with some success. The purpose of this chapter is to assess the utility of and options for measuring self-efficacy in order to understand variations in children's academic performances.

To provide an examination of the pertinent literature on self-efficacy and academic outcomes, we undertook a literature review of all English-language work published between 1997 and 2008, with a focus on students in elementary or secondary education. We also included seminal articles published prior to that time, when necessary, to convey the state of the literature.

Our first task involved scanning the literature to identify recent publications on self-efficacy and sense of control. Search terms included "self-efficacy," "sense of control," "academic," "achievement," "predict," and "measure." We then limited those articles to empirical research that either discussed ways of measuring the constructs, used the constructs as a predictor of academic achievement, or both. In these articles, student self-efficacy and sense of control had to be measured any time before high school graduation. Study outcomes included academic outcomes of grades, test scores, attendance, promotion, and school completion. Although postsecondary attendance and attainment could be the outcomes of the study, the initial measurement of self-efficacy and sense of control had to occur earlier. Studies addressing only nonacademic outcomes, such as depression or psychological distress, were excluded. This approach yielded 31 articles for this review.

4.2 Conceptual Definition

Self-efficacy is a concept drawn from Bandura's (1977) broad social-cognitive theory of the person, which posits that human achievements depend upon the reciprocal interactions of the person's behavior, personal factors (or self), and environmental conditions. Self-efficacy is one of the personal factors and is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 79). No significant challenges to Bandura's original definition have been made, so the field of self-efficacy research is fairly united in terms of how the concept is defined.

Self-efficacy beliefs should be relevant for understanding academic outcomes because self-efficacy leads to specific behaviors and motivations that can encourage or discourage strong performance. As outlined by Bandura (1993), students with high self-efficacy view problems as challenges to be mastered instead of threats and set goals to meet the challenges; they are committed to the academic goals they set; their orientation is task diagnostic, which provides useful feedback to improve performance, rather than self-diagnostic, which reinforces the student's low expectation about what he or she can accomplish; they view failures as due to insufficient effort or knowledge, not as a deficiency of aptitude; and they increase their efforts in cases of failure to achieve the goals they have set. This highlights the reciprocal or cyclical relationships among the environment, self, and behaviors posited by Bandura's (1977) social-cognitive theory. Environmental interventions can improve self-efficacy, which can lead the student to select more challenging tasks, which, in turn, creates more opportunity for useful feedback and can lead to increased self-efficacy and better outcomes. Thus, self-efficacy is critical for dissecting the determinants of academic achievement.

4.2.1 General versus Domain-Specific Application

There is some debate over the level of generality that should be used when applying the concept of self-efficacy. Bandura (1977) originally posited that self-efficacy could be differentiated into academic, social, emotional, and physical components. He furthermore recommended that self-efficacy beliefs will be maximally correlated with performance when the beliefs are assessed at the same level of specificity as the measure of performance. Education researchers have typically assessed self-efficacy for specific tasks, for example, spelling. Some research has suggested that self-efficacy could be applied more parsimoniously without loss of information to the general subdomains of verbal and math self-efficacy (Bong, 1997). Some studies have shown a reasonably high correlation between verbal and math self-efficacy, which further supports the idea that more general measures of self-efficacy might hold promise (e.g., Bong, 1997). Thus, researchers are still attempting to strike the right balance between specificity and generality, though the consensus at this point is that greater domain specificity is preferred.

4.2.2 Relationship to Other Concepts

There are a number of concepts that are sometimes confused with self-efficacy, including academic self-concept, outcome expectations, and perceived control (or sense of control). We review each of these in turn.

Academic Self-Concept

The constructs of academic self-efficacy and academic self-concept have sometimes been used interchangeably, but they are theoretically and empirically distinct. Briefly, a student's academic self-efficacy could be viewed as part of, but not identical to, his or her academic self-concept. Self-efficacy is a cognitive assessment of one's capabilities. Academic self-concept includes this, but also includes affective, motivational, and evaluative components (Bong & Clark, 1999). This was underscored empirically in a study by Pietsch, Walker, and Chapman (2003) in which items from a mathematics self-efficacy measure and the competency—but not affective—component of a mathematics self-concept measure loaded on the same factor in a confirmatory factor analysis. Students are thought to make self-efficacy assessments using absolute standards of success related to the goals of the specific task at hand

(e.g., "Can I answer all of the word problems on the test?"), whereas assessments of ability that contribute to self-concept are thought to be based more on normative, comparative standards (e.g., "Can I get as many problems correct as most other students?").

It is important to note that self-concept is usually operationalized using measures that reflect perceived competence more than the affective component of academic self-concept. For this reason, the empirical literature cannot always be easily sorted into findings regarding self-efficacy and self-concept. For example, Putnam (2005) interpreted the Self-Concept subscale of the Motivation to Read Profile as a measure of reading self-efficacy because the items appeared to address key components of self-efficacy.

Outcome Expectations

Self-efficacy is similar to, but distinct from, a motivational factor included in Bandura's theory, known as "outcome expectations." These beliefs concern the consequences the person expects from his or her actions. These are likely to be highly correlated with the person's self-efficacy for the task at hand. It is possible, however, that a student could have high self-efficacy for her ability in math—that she has the capability to do math very well—but at the same time feel she is unlikely to receive a good grade because the teacher seldom gives high math grades to girls (Schunk & Pajares, 2002).

Perceived Control

This concept is sometimes considered part of self-efficacy, but is not identical to it (Schunk & Pajares, 2002). Perceived control is a general perception the student has regarding his ability to control how the student learns and what outcomes result from the learning. This would include the student's sense of control over his or her use of learning strategies, control over the amount of effort expended, and attention control. Part of a self-efficacy belief might entail the student's perception that she can control her efforts to attain the desired goal, but this perception of control is likely to apply specifically, rather than generically, to the task at hand.

4.3 Studies of Self-Efficacy and School Performance, 1997–2008

4.3.1 Measures Used

Following Bandura, most measures elicit students' confidence that they can perform a specific set of tasks or types of tasks. Bandura (1997) also stated that the relationship between self-efficacy beliefs and performance is likely to be stronger when they are both measured in close temporal proximity. These self-report measures are made up of items such as "How confident are you that you can perform each of the following reading tasks?" and "How well can you finish homework assignments by the deadlines?" Students mark their responses on a Likert scale where, for example, 1 is "not well at all" and 7 is "very well." Pajares (1996) conducted a thorough review of the self-efficacy measures used through the mid-1990s. One criticism of some measures, for example the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & DeGroot, 1990), however, is that some items begin with a statement like, "Compared with other students in this class." This triggers a normative, comparative frame of reference rather than a mastery-based one, so some researchers drop this phrase or these items when using the measure (e.g., Malpass, O'Neil, & Hocevar, 1996).

This section gives an overview of the number and types of measures currently at use in the field of self-efficacy research. Table 4-1 summarizes the measurement approaches taken by these studies and provides key features of the measures, such as whether they were self-reported, and any subscales the measures include.

A relatively recent and ambitious measurement initiative was undertaken by the Organization for Economic Co-operation and Development (OECD) to devise a general measure of the affective constructs in educational psychology (Marsh et al., 2006). The Student's Approaches to Learning (SAL) instrument was evaluated among approximately 4,000 15-year-olds from each of 25 countries, including the United States. The instrument assesses 14 different factors, most of which appear to be invariant across countries. One factor is perceived self-efficacy, assessed by four items querying students about their confidence in their ability to do well on academic tasks in general. Thus, it is not a subject- or task-specific assessment. This scale had an overall Cronbach's alpha of 0.77, which is acceptable given that there are only four items. Consistent with Bandura's (1986) theory, interfactor correlations for perceived self-efficacy were greatest for the persistence and academic self-concept factors. Scores on perceived self-efficacy demonstrated modest associations with standardized reading and math performance ($r = .27$ and $.29$, respectively). These smaller correlations are likely due to the generic nature of the self-efficacy assessment and the broad type of performance metrics used.

4.3.2 Study Results

We first present an overview of the study types, samples and measures used, and types of outcomes examined. We then discuss the findings concerning how self-efficacy relates to academic outcomes. Note that 1 of the 31 studies reviewed was a meta-analysis, so it is not included in the tallies given below.

Distribution of Study Types

Table 4-2 presents information on the studies reviewed. Of the 30 empirical studies, only 6 were longitudinal; the remaining 23 were cross-sectional. Two of the longitudinal studies were done with preschool samples; one each was conducted at the elementary school, middle school, and high school levels; and one additional study crossed these boundaries. This predominance of cross-sectional research suggests that causal inferences that have been made to date about self-efficacy and outcomes could be bolstered by more rigorous empirical efforts.

Distribution of Samples

Sample size and age also varied a great deal. The smallest sample had 14 5th- and 6th-grade students; the largest contained 3,760 students in grades 4 through 11. Sample members were of preschool age in 3 of the studies, in elementary school in 3 of the studies, in middle school in 5 of the studies, in high school in 13 of the studies, and in some combination of these levels in 7 of the studies. Samples were school based, and in a handful of studies, included students from more than one school. None of the samples, however, was representative on the national or even state levels.

Table 4-1. Selected Measures of Self-Efficacy: Key Features

Measure Name	Data Source	Subscales	Number of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Adjustment Scales for Preschool Intervention (ASPI)	Teacher report	Aggression, opposition, inattentive-hyperactivity, withdrawal-low energy, and social reticence	144	1	Head start children	Fantuzzo et al. (2007)
Belief assessment	Student report	Demographic information (Items 1-4), reading ability (Items 5-24), motivational beliefs (Items 25-45), self-efficacy beliefs (Items 46-50), achievement behavior (Items 51-70), and effort attributions (Items 71-80)	80	1	9th graders	Eaton & Dembo (1997)
Children' Multidimensional Self-efficacy Scales	Student report	Self-efficacy for self-regulated learning scale; Self-efficacy for academic achievement scale	20	2	High school	Zimmerman et al. (1992)
Early Adolescent Temperament Questionnaire	Student and parent report	Attention shifting, activation control, and inhibitory control	18 for parents, 16 for children	1	Children ages 7-12	Valiente et al. (2007)
Head-to-Toes Task	Student report	Inhibitory control, attention, and working memory	10	1	Not specified	McClelland et al. (2007)
Index of Self-Efficacy for Writing (ISEW)	Student report	Planning, translating, and reviewing	36	1	Upper elementary school students	Smith et al. (2002)
Morgan-Jinks Student Efficacy Scale (MJSES)	Student report	Talent, effort, task difficulty, and context	34	1	Middle school Students	Jinks & Morgan (1999)
Motivated Strategies for Learning Questionnaire	Student report	NA	6	3	Middle and High School	Bong (1998)
Patterns of Adaptive Learning Survey (PALS)	Student report	Learning-focused (mastery) academic goals, ability-focused (performance) goals, student self-efficacy, use of surface learning strategies; use of deeper learning strategies	34	2	Middle school Students	Meyer et al. (1997)

Table 4-1.   Selected Measures of Self-Efficacy: Key Features (continued)

Measure Name	Data Source	Subscales	Number of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Children's Behavior Questionnaire	Student report	Anger, approach, attention, inhibitory control	16	1	3- to 5-year-olds	Blair & Razza (2007)
Perceived Self-Efficacy Scale	Student report	NA	Not specified	1	8th graders	Brookhart et al. (2006)
Problem-referenced self-efficacy	Student report	Six subject areas: English, Spanish, U.S. history, algebra, geometry, and chemistry	42	2	High school	Bong M. (1997)
Researcher-developed scale, including some items from Bachman's School Ability Self-Concept Index	Student report	Self-esteem, racial self-esteem, academic self-efficacy, and importance of completing school to self	8	1	High school	Saunders et al. (2004)
Researcher-developed scale	Student report	NA	7	1	Elementary, middle, and high school	Usher & Pajares (2008)
Sources of Academic Self-Efficacy Scale (SASES)	Student report	Personal performance accomplishment, vicarious learning, social persuasion, and emotional arousal	Not specified; 11	1	High school	Hampton & Mason (2003)
Self-efficacy for Learning Scale (SELS)	Student report		11	1	High school	Hampton & Mason (2003)
Self-Assessment Questionnaire (SAQ)	Student report	Perceptions of math ability, perceived effort exerted in math tasks, perceived value of math, perceived math self-efficacy	26; 8	1	High school	Hong & Aqui (2004)
Activities and Accomplishment Inventory (AAI)	Student report		8	1	High school	Hong & Aqui (2004)
Self-Efficacy Questionnaire for Children (SEQ-C)	Student report	Social self-efficacy, academic self-efficacy, emotional self-efficacy	24	1	High school	Muris (2001)
Self-efficacy scale	Student report		7	2	High school	Greene et al. (2004)

Table 4-1. Selected Measures of Self-Efficacy: Key Features (continued)

Measure Name	Data Source	Subscales	Number of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Researcher developed task assessing specific math self-efficacy	Student report		20	1	High school	Stevens et al. (2004)
Teacher and Student Efficacy Beliefs Survey	Teacher and student report	Using prior knowledge, self-monitoring, cooperative learning, and using graphic organizers	40	1	Middle school Students	Barkley (2006)
The Middle School Self-Efficacy Scale	Student report	Career decision-making self-efficacy; career decision-making outcome expectancies, intentions, and goals; math and science self-efficacy; and math and science outcome expectancies, intentions, and goals	47	1	Middle school Students	Fouad et al. (1997)
The Perceived Competence Scale for Children	Student report	Cognitive, social, physical, and general	28	1	Elementary school	Harter (1982)

Table 4-2.   Approaches to Studies of Self-Efficacy

Study Approach	Count of Studies Using This Measure
Can study be replicated?	
Data and survey are available	5
Questionnaire is available	18
No, neither data nor survey are available	4
Is sample generalizable	
Sample of convenience (an existing intervention program)	30
Within school	30
Within district or region	0
Nationally representative	0
What is the method of analysis?	
Case study	1
Bivariate	2
Multivariate	20
Multilevel	2
What is the time frame of the study?	
Cross–sectional	23
Longitudinal	6
At what grade level is the construct measured?	
Preschool	3
Elementary	3
Middle	5
High	13
Multiple	7
What is the source of information?	
Student report	25
Teacher report	4
Parent report	1
Researcher observation	0

Distribution of Measures

Across the 30 studies, 26 measures of self-efficacy were used, highlighting the lack of a widely accepted and proven measure of self-efficacy. In a number of studies, researchers modified existing measures to create their own, untested instruments that were neither comparable to the sources from which they were drawn nor necessarily an improvement. Most of the measures (21) were self-report, 4 were teacher ratings, and 1 relied on parents ratings. As expected, the measures used corresponded with the age of the students in the sample. In early elementary studies, teacher/parent rating measures were used. Starting around the beginning of middle school, there was a heavier reliance on self-report measures.

Distribution of Outcomes

Most studies looked at self-efficacy in relation to grades (five in math, five at grades in general). Three looked at exam scores, and five had other outcome measures, such as teacher scores. Eight studies did not include outcome measures because their focus was on self-efficacy measure development. When

exams were used as outcome measures, they were most often standardized assessments, such as the Iowa Test of Basic Skills and the Test of Early Math Ability (TEMA).

Relationship Between Self-Efficacy and Academic Achievement/Behaviors

Research on the relationship between academic self-efficacy and outcomes has generally focused on two classes of outcome (Pajares, 1996). The first class of outcomes is actual performance on some academic task, such as subtraction. The second class includes more distal outcomes, such as selection of major field of study in college or a career choice. Given that the outcomes to be measured will be restricted to kindergarten through 12th grade, we limit our review to the first class of outcomes.

4.4   Meta-Analysis of Research from 1977–1988

The past two decades' worth of research on self-efficacy and academic performance should be examined in the context of a seminal meta-analysis reported by Multon and colleagues (1991) in which they summarized all such research conducted from 1977 through 1988. This period marks the first decade after Bandura's introduction of the construct. Multon et al.'s meta-analysis examined the relationship between self-efficacy and academic performance on the one hand, and persistence in academic tasks on the other. There were 36 studies for academic performance, which included 38 samples of research subjects, and 18 studies for academic persistence, which included 18 samples of subjects. The overall effect size estimates (Pearson's r) were 0.38 for performance and 0.34 for persistence, although there was significant heterogeneity among individual effect size estimates.

A number of factors seemed to influence the size of the relationship between self-efficacy and academic performance:

- First, stronger relationships were found in experimental studies involving interventions ($r = .58$) compared to correlational studies ($r = .32$). This is important for causal inference as well. In correlational studies, there may be a number of different constructs associated with one another, making it difficult to isolate the causal priority of self-efficacy beliefs. In experimental studies that attempted to manipulate self-efficacy beliefs (e.g., through guided mastery, modeling, feedback), one observes stronger relationships that have clearer causal interpretations.

- Second, relationships were stronger for samples of low-achieving students ($r = .56$) relative to students achieving at expected levels ($r = .33$), although this might have been a methodological artifact. Effect size estimates for low-achieving students tend to come from studies using experimental manipulations, which also generate higher effect sizes. Thus, these two factors might be confounded to some degree.

- Third, the type of performance measure was associated with the magnitude of the relationship. Specifically, stronger effect sizes were observed for basic skills measures ($r = 0.52$), followed by classroom-based measures, such as grades ($r = .36$), and were weakest for standardized achievement tests ($r = .13$). This finding supports the idea of the domain-specific nature of self-efficacy beliefs, in that the strongest associations were found for those outcomes that were most similar to the way self-efficacy was measured.

- Finally, and especially relevant for this chapter, relationships were stronger for high school– or college-aged students ($r = .41$ and .35, respectively) than for elementary school students (r

= .21). This may have occurred because older children have more experience observing their own performance and therefore have more accurate beliefs about their abilities.

Research conducted since 1988 has generally supported the conclusions of the Multon et al. meta-analysis. In particular, later research (see Pajares [1996] for a review), has underscored the importance of the third factor listed above.

When efficacy beliefs are globally assessed and/or do not correspond with the criteria tasks with which they are compared, their predictive value is diminished or can even be nullified, and when efficacy assessments are tailed to the criterial task, prediction is enhanced (Pajares, 1996).

4.4.1 Mediational Analyses Involving Self-Efficacy

More recent research on self-efficacy and academic achievement often examines one or more mediational questions. An early test of mediational hypotheses was conducted by Schunk (1981) in a study to evaluate the effects of an instructional intervention to improve long division. Using path analysis to estimate parameters in a causal model, the author found a direct effect of the intervention on achievement. More important, however, was the finding of an indirect effect of the intervention on achievement via a pathway from the intervention to improved math self-efficacy and then to improved persistence. There was also direct effect of self-efficacy on persistence and achievement.

Bandura, Barbaranelli, Caprara, and Pastorelli (1996) published a seminal article in which they estimated parameters for a causal model relating self-efficacy to its theoretical antecedents and consequences in a sample of 279 6th and 7th graders and their parents in Rome, Italy. A 37-item self-efficacy measure was used, which yielded scores on academic, social, and self-regulatory self-efficacy. The findings involved relationships among 13 variables, including the three types of self-efficacy. With respect to academic self-efficacy, the authors found its impact on achievement was mediated by its influence on academic aspirations, prosocial peer relations, lowered vulnerability to depression, and adherence to moral self-sanctions. This classic study remains the most comprehensive account of the myriad ways in which academic self-efficacy works in concert with other noncognitive components to affect achievement.

As an example of a study in which academic self-efficacy was specified as a mediator, Zimmerman, Bandura, and Martinez-Pons (1992) tested a causal model explaining final grades in social studies among 102 9th- and 10th-grade students. Self-efficacy for regulated learning and academic self-efficacy were measured using the Children's Multidimensional Self-Efficacy Scales. These scales assessed generic, not subject- or task-specific, self-efficacy. Part of the causal model specified that the relationship between prior grades and final grades would be mediated by self-efficacy for regulated learning, which in turn, influenced academic self-efficacy. The data fit this mediational model reasonably well, although it is noteworthy that alternative models were not tested for the sake of comparison. The overall model, which included prior grades, parent grade goals, student grade goals, and both types of self-efficacy, explained 31% of the variance in final social studies grades.

As discussed earlier, there is a reciprocal or cyclical relationship between self-efficacy and other key constructs. Bandura (1997) has shown that, in the domain of reading, students who learn reading

skills subsequently modify their strategy use. As their strategy use improves, their reading performance improves. Students' perceptions of this increase in performance leads to higher self-efficacy for reading, which leads students to see more value in strategy use, which leads to even better outcomes, and so on.

Liew, McTigue, Barrois, and Hughes (2008) examined whether self-efficacy mediated the link between self-regulatory processes and math and literacy achievement in 733 children followed from 1st grade through 3rd grade. Self-efficacy was measured using six items from the Cognitive Competence subscale of the Perceived Competence Scale for Children (Harter, 1982). Self-regulation (i.e., adaptive/effortful control) in 1st grade contributed to self-efficacy in 2nd grade, which contributed to literacy or math achievement in 3rd grade. While self-efficacy was related to math and literacy outcomes, it did not partially mediate their relationships with effortful control as expected.

Pajares and Valiante (1997) used path analysis to examine the role of self-efficacy in understanding the essay-writing performance of 218 5th-grade students. They measured writing self-efficacy using Shell, Murphy, and Bruning's (1989) Writing Skills Self-Efficacy scale, which asks students to rate their confidence from 0 to 100 on each of eight writing skills. Writing self-efficacy was predictive of students' apprehension about writing, perceived usefulness of writing, and essay writing performance. Gender and writing aptitude were also predictive of these same variables. As Bandura's (1986) theory would predict, however, writing aptitude's relationship with apprehension, perceived usefulness, and writing performance were partially mediated by self-efficacy.

These studies serve to illustrate the types of mediational questions addressed by research on academic self-efficacy. Overall, they underscore the importance of self-efficacy for understanding variations in academic outcomes. These meditational studies also demonstrate that self-efficacy is critical for assessing the nature of the relationships between interventions in the environment, other noncognitive (especially motivational) factors, and academic outcomes.

4.4.2　Variations by Gender and Race/Ethnicity

Generally, boys express more confidence in academic areas involving math, science, and technology (for example, Pajares & Miller 1995), even though girls' performance in these domains is on par with most of their male peers. Boys and girls express similar levels of confidence in other academic areas involving language skills, even though girls typically do better in these subjects.

As Schunk and Pajares (2001) observed, the literature has identified one factor especially relevant for considering measurement options, which is whether a comparative approach is used in assessing self-efficacy. Typically, students rate their confidence that they possess certain skills or can accomplish particular tasks. In the context of self-efficacy for writing, Pajares and colleagues (1999) used this traditional method, along with asking students to judge their writing ability relative to other boys and other girls in their class and school. Girls outperformed boys on the writing task, but traditional measures showed equal levels of self-efficacy among boys and girls. When asked to compare themselves with others, however, girls rated themselves as better writers than boys. Thus, if gender differences in self-efficacy are of interest, greater research is needed to understand the best way to measure self-efficacy for this purpose.

Little research has examined racial/ethnic differences in academic self-efficacy. This work is very challenging given the strong confounding relations among race/ethnicity and socioeconomic status. That is, there are many factors related to self-efficacy and to self-identified race/ethnicity that are also predictive of achievement. As Schunk and Meece (2005) suggested, a greater research priority in this area is exploration of the process by which self-efficacy beliefs are created and how this process might differ among subpopulations.

4.5   Discussion

Self-efficacy has been found to be an important noncognitive skill. Furthermore, the studies reviewed also indicated that it can be improved, making this a worthy area of further research and investment. Its reciprocal nature means that it is developed through feedback and continues to add unique variance in explaining differences in outcomes. Measurement decisions regarding self-efficacy must consider level of generality: task-specific (e.g., word problems), domain-specific (e.g., math), or generic (e.g., academic). Choice of measure for self-efficacy should be based on the types of academic outcomes being measured and the level of generality of those outcomes. (For example, the most general outcome would be GPA, as opposed to the more specific outcome of score on an algebra exam.) As Bong (1998) and Pajares and Miller (1995) demonstrated, general measures of academic self-efficacy can be good predictors of more general or aggregated academic achievement. But, in general, the best predictors of specific academic performances will be self-efficacy beliefs about those specific academic problems (Pajares, 1996).

Mediational research has underscored the importance of a multidimensional assessment of noncognitive factors. Academic self-efficacy will certainly be correlated with academic outcomes, provided they are measured at the same level of generality. This simple relationship, however, will likely mask the many indirect effects (i.e., mediating relationships) involving student, home, and school factors in determining outcomes. Failure to understand this complexity using a multidimensional measurement strategy might mean that research findings will be used to justify interventions that target the wrong construct.

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Academic Self-Concept

Author: Jeffrey Rosen

5.1   Introduction

Self-concept has a research history spanning decades. A major contribution offered by the educational literature is to distinguish the concept of *academic self-concept* from self-concepts in other domains of activity. In theory, a positive academic self-concept should lead to gains in academic achievement. Specifically, students with positive views of their academic abilities are likely to engage in more achievement related behaviors, which might include completing homework, studying for tests, and participating in class activities (Valentine et al., 2004). The key to understanding self-concept in an academic context and from an applied educational perspective is to understand conceptually what academic self-concept represents and its specific relationship to numerous academic outcomes.

This review has three distinct aims. First, drawing on recent definitions offered in the literature, academic self-concept will be defined conceptually. This includes drawing important distinctions between students' self-concept perceptions towards school and towards specific academic domains. This also includes reviewing the theory on the causal relationship between academic self-concept and achievement outcomes. Second, the approaches taken to measure academic self-concept will be reviewed. Last, the major findings in the most recent literature will be reviewed and suggestions on how the findings could be even more robust will be offered.

5.2   Methods

Our initial search of the literature extracted citations and abstracts that referenced the term "academic self-concept." This yielded 849 citations from 1997 through 2008. We reviewed these abstracts and identified those studies that focused on the relationship between academic self-concept and some aspect of academic achievement. We excluded studies that, (1) focused on parents, teachers, or administrators as the unit of analysis; (2) utilized unique definitions of academic self-concept; and (3) focused only on psychometrically evaluating an academic self-concept measurement instrument. This process resulted in a final sample of 42 articles that serve as the basis of this review.

5.3   Conceptual Definition

Unlike some other constructs studied in this review (e.g., motivation and effort), the underlying conceptual definition of academic self-concept seems largely uncontroversial. Academic self-concept, broadly defined, can be thought of as a student's self-perception of academic ability formed through individual experiences and interactions with the environments (O'Mara et al., 2006; Valentine et al., 2004). Importantly, academic self-concept is formed and developed through interactions with a student's significant others (i.e., parents, teachers, or peers) and therefore is dynamic as a student progresses

through schooling. Regardless of the scope of specific research, researchers generally employ this central definition of academic self-concept.

5.3.1 Global Self-Concept and Domain-Specific Self-Concept

One of the more important distinctions within the definition of academic self-concept is that between global and domain-specific self-concepts. Academic self-concept globally is a student's perception of his or her general ability in school. However, many researchers have argued that academic self-concept is likely multidimensional and varies across school subjects and within students. Therefore, a large number of researchers have drawn distinctions between, for example, math self-concept (i.e., students' belief that they can do well in mathematics) and reading self-concept (i.e., students' belief that they can do well in reading or language arts). A fairly well-developed literature in educational psychology demonstrates that students distinguish between the various domain-specific (e.g., math, reading, science) elements of academic self-concept (see, for example, Yeung et al., 2000). A synthesis of this literature is beyond the scope of this review, but to understand the relationship between academic self-concept and academic achievement outcomes, it is necessary to understand that general and domain-specific self-concepts may be different. This difference is most critical in terms of understanding the *causal* relationship between academic self-concept and achievement outcomes.

5.3.2 The Causal Relationship between Academic Self-Concept and Achievement

The question of causality between academic self-concept and achievement outcomes has been featured prominently in the academic self-concept literature, but the direction of causality remains somewhat controversial. Three models describe the casual relationship between self-concept and achievement: the skill-development model, the self-enhancement model, and the reciprocal effects model.

In the skill-development model, academic self-concept is a consequence of prior academic achievement. Self-concept, be it global or in relation to a specific academic domain, develops as a student gets feedback on academic work (Guay et al., 2003). In the self-enhancement model, prior self-concept is one determinant of academic achievement. The reciprocal effects model argues that prior self-concept predicts subsequent self-concept *and* subsequent academic achievement (Marsh & Craven, 2006). Furthermore, prior academic achievement predicts subsequent self-concept, hence reciprocal effects. Figure 5-1 shows the hypothesized self-concept-to-achievement causal relationships in the reciprocal effects model over three time periods.

5.4   Measurement Approaches

In this section, we discuss the specific approaches researchers have used to measure academic self-concept. The nature of self-concept—that it is a reflection of a student's self-beliefs about one's academic ability—probably necessitates a student self-report measurement approach. All the research reviewed here utilizes such an approach. Across the studies included in this review, the strategies for measuring self-concept generally employ a few well-known survey instruments. Although researchers may modify some items to suit their research questions, in general, most academic self-concept studies use some variant of the Self-Description Questionnaire, or the Self Perception Profile for Children/for Adolescents (SPP-C and SPP-A).

Figure 5-1. Hypothesized Causal Relationships in the Reciprocal Effects Model
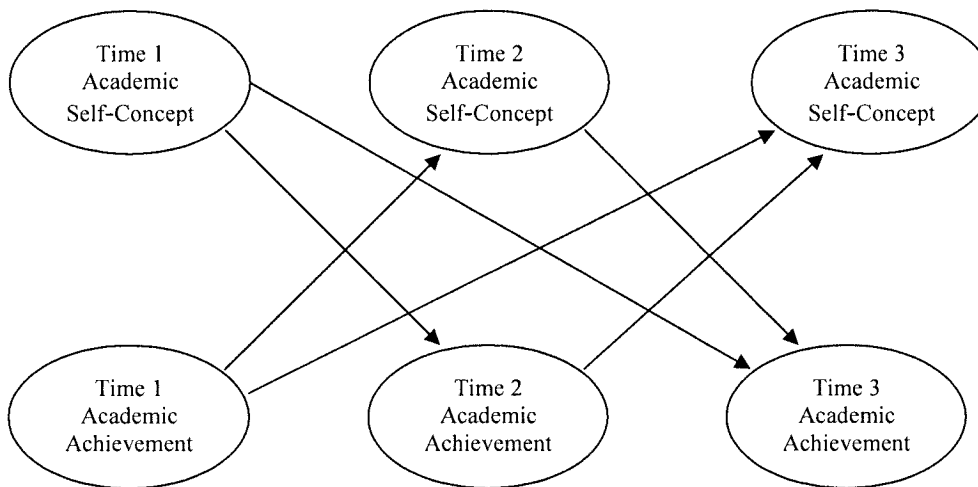
5.4.1   Self-Description Questionnaire and the Academic Self-Description Questionnaire

The SDQ-I (preadolescent), SDQ-II (adolescent), and SDQ-III (late adolescent) instruments appear to be the most widely used measures of self-concept in this literature. From these instruments, the more scholastically focused Academic Self-Description Questionnaire (ASDQ) (see Marsh, 1990, 1992; see also Byrne, 1996a, 1996) was developed for use in school-aged child populations. The ASDQ is a multidimensional (i.e., more than one academic domain) self-concept instrument based on prior SDQ research. Although a complete discussion of the validity of the ASDQ is beyond the scope of this review, a favorable review of is psychometric properties can be found in Byrne (1996), who noted that the basic structure of the ASDQ is patterned after the SDQ, and it is reasonable to assume that the ASDQ will yield the same high-quality data.

Like the SDQ family of measures, the ASDQ is a series of age-based instruments. The ASDQ-I is intended for preadolescents, the ASDQ-II is intended for adolescents, and the ASDQ-III is intended for late adolescents. The ASDQ items tap into self-concepts in multiple academic areas, as well as a student's self-concept globally. Examples of items used to tap into specific academic areas include the statements, "I get good marks in ENGLISH LANGUAGE classes," "Work in HISTORY classes is easy for me," "I am hopeless when it comes to MATHEMATICS classes," "I have always done well in ENGLISH LITERATURE classes," and "I get good marks in SCIENCE classes." Examples of items that tap global self-concept include "Overall, I have a lot to be proud of," and "I can do things as well as most people."

The ASDQ uses an 8-point scale with the following labels: Definitely False, False, Mostly False, More False Than True, More True Than False, Mostly True, True, and Definitely True.

5.4.2 Self-Perception Profile for Children (and Adolescents)

Harter's (1982) SPP-A and SPP-C are also commonly used instruments in this research. Like the SDQ, the SPP-A/C measures multiple domains (other than academic) of self-concept. Scholastic competence is measured, along with athletic competence, social acceptance, physical appearance, job competence, close friendships, romantic appeal, behavioral conduct, and global self-worth. Unlike the SDQ/ASDQ, academic domains (e.g., math, science) are not individually measured by the SPP-A/C.

The standard format for the SPP-A/C asks students to choose which of two statements is more true for them and then to indicate whether that statement was "sort of true" or "really true" for them. Statements include the following: (1) Some kids feel that they are very good at their schoolwork, but other kids worry about whether they can do the schoolwork assigned to them. (2) Some kids feel like they are just as good in their class work as other kids of their age but other kids aren't so sure and wonder if they are as good. (3) Some kids are pretty slow in finishing their schoolwork but other kids can do their schoolwork quickly. (4) Some kids do very well at their class work but other kids don't do well at their class work. (5) Some kids have trouble figuring out the answers in school but other kids can almost always figure out the answers.

The standard questions above are not academic domain specific. They tap general attitudes toward school. A few researchers adapt these scales to assess domain-specific academic attitudes. An example of this comes from Bouchey and Harter (2005). They assessed adolescents' perceived academic competence in math and science by modifications of the five academic subscale items of the SPP-A (Harter, 1985). For example, "I am smart for my age in math/science" and "I am pretty slow at finishing work in math/science" replace the more global measures normally used in the SPP-A.

5.4.3 Other Instruments

A few other instruments are used in the literature, but less widely so. For example, the Perception of Ability Scale for Students (PASS) (Boersma & Chapman, 1992) has been used to measure academic self-concept by a fairly narrow range of researchers. The PASS measure of academic self-concept contains 70 yes/no, domain-specific items related to perceptions of ability in reading, spelling, language arts, math, and writing. Examples of items included in the scale are "I am a good reader," "I make many mistakes in school," and "I like math." (Thus, these items are similar in directness and complexity as the ASDQ items.) Several independent psychometric evaluations provide support for the reliability and validity of the PASS (e.g., Byrne, 1996). An important subscale of the PASS is the Reading Self-concept Scale (RSCS) (Chapman & Tunmer, 1999).

The RSCS contains three subscales that assess a student's perceptions of competence in, difficulty with, and attitudes toward reading. The response points for each scale are yes, always; yes, usually; undecided or unsure; no, not usually; or no, never.

5.5 Studies of Academic Self-Concept and School Performance, 1997–2008

The research reviewed here suggests that the correlational relationship between self-concept and academic outcomes is overwhelmingly positive. Students generally feel more competent in academic

areas in which they achieve well (Denissen et al., 2007). Be it global or academic domain specific, a student's self-concept and academic achievement, measured by grades and test scores, are positively related, and nearly every study referenced in this review finds a positive relationship between the two.

Given the consistency of this finding, the remainder of this section focuses on the causal ordering of self-concept and achievement, gender issues in self-concept development, and how self-concept may change through schooling.[3] Table 5-1 outlines some key features of self-concept measures, and Table 5-2 outlines approaches to the study of self concept.

5.5.1 Evidence on Causality

As stated previously, the issue of causality—whether self-concept demonstrates a causal relationship to achievement or vice versa—is an often-studied and relatively controversial issue in academic self-concept research. In a series of studies spanning nearly 10 years, Marsh and colleagues (Guay et al., 2003; Marsh & Yeung, 1997, 1998; Marsh et al., 2005) repeatedly reported evidence that academic self-concept causes subsequent changes in academic achievement. They also reported evidence that the reverse is true: achievement causes changes in self-concept. Therefore, they claim this evidence supports the reciprocal effects model.

Marsh and Yueng (1997), in a sample of Australian upper-middle and high schools students, provided early evidence supporting the reciprocal effects model. In the models they estimated, the path coefficients leading from academic achievement (reading, science, and math) to the immediately subsequent domain-specific self-concepts were positive and statistically significant, and were slightly larger than those leading from domain-specific self-concept to achievement. Marsh and colleagues (2005), in a sample of German 7th graders tested at two points during the same school year, again found reciprocal effects, this time between math self-concept and achievement. In this longitudinal research, the strongest effect of math self-concept at the beginning of 7th grade was math self-concept in the middle of 7th grade. The effect of math self-concept at the beginning of 7th grade was also statistically significant for both math grades in the middle of 7th grade (effect size of .24) and math test scores in the middle of 7th grade (effect size of .09), even after controlling for the effects of other measures, including 6th grade achievement. Interestingly, the effects of academic achievement on self-concept were smaller than the effects of self-concept on academic achievement.

Guay et al.'s (2003) findings also support a link between prior academic self-concept and subsequent academic achievement at the early and middle elementary grades. In this study, students in grades 2, 3, and 4 were measured annually over 3 years, and there was stronger support in the data for the self-enhancement model (academic self-concept predicts subsequent achievement) than for the skill-development model (academic achievement predicts subsequent academic self-concept) for all three age cohorts. Again, the claims the authors made are based on the size of the path coefficients they estimated.

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[3] These represent the major themes present in the literature reviewed here.

Table 5-1. Measures of Self-Concept: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Self-Description Questionnaire (SDQ)	Student	Academic domain-specific measures of self-concept	Varies	6	Multiple ages	Pietsch, Walker, & Chapman (2003)
Academic Self-Description Questionnaire (ASDQ) ASDQ-I—preadolescents ASDQ-II—adolescents ASDQ-III—late adolescents	Student	Academic domain-specific measures of self-concept	Varies	4	Multiple ages	Marsh & Yeung (1997)
Self Perception Profile for Children and for Adolescents (SPP-A and SPP-C)	Student	Scholastic competence, athletic competence, social acceptance, physical appearance, job competence; close friendship; romantic appeal; behavioral conduct; and global self-worth.	Varies	5	Multiple ages	Bouchey & Harter (2005)
Perception of Ability Scale for Students (PASS)	Student	Reading, spelling, language arts, math, and printing/ Writing	70	1	Upper elementary school, grades 3-6	Chapman et al. (2000)
Reading Self-concept Scale (RSCS)	Student	Academic domain-specific measures	150	1	Multiple ages	Zanobini & Usai (2000)

Table 5-2.   Approaches to Studies of Self-Concept

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	1
Elementary	10
Middle	5
High	14
Multiple	12
What is the time frame of the study?	
Cross-sectional	9
Longitudinal	33
What is the method of analysis?	
Case study	0
Bivariate	2
Multivariate	9
Multilevel	31
Is sample generalizable?	
Sample of convenience (an existing intervention program)	0
Students identified as at risk	0
Within school	3
Within district or region	33
Nationally representative	6
Can study be replicated?	
Data and survey are available	8
Questionnaire is available	22
No, neither data nor survey are available	12

Buhs (2005) examined the relationships between change in academic achievement (dependent variable) and academic self-concept, classroom engagement, victimization, peer rejection, and exclusion. Higher victimization scores were associated with lower academic self-competence (effect size of −.19). Higher levels of exclusion significantly predicted lower academic self-competence and lower classroom engagement scores (−.12 and −.25, respectively). Lower academic self-competence was linked to both lower classroom participation and to lower values on the change in achievement dependent variable (.31 and .11, respectively). Academic self-concept was linked to engagement, but also linked *directly* to achievement change. Importantly, engagement did not fully mediate the relationship between self-concept and achievement. While this study only investigated achievement changes over a short time (fall to spring of 5th grade), it provides some support for the self-enhancement model and points to potentially important moderators (e.g., engagement).

Other researchers are skeptical of the reciprocal effects and self-enhancement models or argue that this relationship is far more complex. In a longitudinal study of young children just beginning school, Chapman, Tunmer, and Prochnow (2000) presented evidence (n = 60) that academic self-concepts form in response to early learning experiences. The authors selected 60 5-year olds who started school in 1993 and completed the PASS self-concept instrument. The students were stratified in three tiers; the top 15% (n = 20) represented the study's positive academic self-concept group, the bottom 15% (n = 20)

represented the negative academic self-concept group, and the modal 15% (n = 20) represented the typical academic self-concept group. At the first measurement point (beginning of schooling), the authors attempted to predict academic self-concept group membership (top, bottom or typical) using letter-name knowledge, phoneme deletion, and sound matching. Positive and negative group memberships were predicted 80% and 65% of the time, respectively. Typical group membership was predicted 40% of the time. Reading-related skills and performance seem to be predictive of positive and negative academic self-concept status, but less so of typical academic self-concept status. However, these data do suggest that early reading experiences are likely driving self-concept formation. Chapman et al. went on to show how self-concept, particularly a negative self-concept, can remain intact throughout early schooling. At the completion of their first year of schooling and again during the middle of their third year of schooling, children with negative academic self-concept read lower level books in class and performed at lower-levels on several reading measures than did those children with positive self-concept. Furthermore, differences emerged between those children with negative and typical (modal) self-concept. At the end their first year of schooling, children with negative academic self-concept had poorer reading skills than did those children with typical self-concepts. And, by the middle of their third year, children with negative self-concepts had poorer reading word recognition and reading comprehension skills than children with typical academic self-concept.

Gonida, Kiosseoglou, and Leondari (2006) provided evidence that emphasizes the significance of school achievement in formulating subsequent responses. Theses authors also introduced a third set of variables they call *theories of implicit intelligence* (i.e., agreeing with a statement like, "You have a certain amount of intelligence and you really can't do much to change it") and suggested that the self-concept and achievement relationship is not simple. In a sample of 187 5th and 6th graders, students completed self-concept measurements twice, a year apart. Thus, 5th graders were retested when they were 6th graders, and 6th graders when they were 7th graders and had moved from elementary to high school.[4] The authors tested multiple causal models of self-concept, achievement, and implicit theories of intelligence, finding the strongest evidence for the model where school achievement influences academic self-concept which, in turn, influences implicit theories of intelligence. For the simple relationships tested, Time 1 school achievement significantly predicted Time 2 academic competence, school achievement at Time 1 also predicted implicit theory at Time 2, and academic competence at Time 1 predicted implicit theory at Time 2. However, an important contribution this study makes to our understanding of the relationship between school achievement and self-concept is to suggest that other psychological variables may have to be considered to fully understand this relationship. In other words, the simple causality argued by the skill development and self-enhancement models may not provide an accurate description of the interplay between these variables. The strongest evidence reported by Gonida et al. shows that the effect of Time 1 school achievement on Time 2 implicit theories of intelligence was significant when Time 1 school achievement, Time 1 academic competence, and Time 2 academic competence were tested simultaneously into the same model. In other words, school achievement drove the relationships.

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[4] This is a sample of Greek students and, in Greece, elementary school lasts 6 years, followed by high school starting in the 7th grade.

Herbert and Stipek (2005), in a sample of 345 elementary students, found that student achievement (measured with standardized test scores) was strongly predictive of children's judgments of their literacy skills. In this longitudinal study of children from kindergarten or 1st through 5th grade, child competency ratings were gathered in kindergarten or 1st grade and again in 3rd grade and 5th grade. The authors regressed self-concept in literacy and in math (separate regressions for each domain) on actual achievement in literacy or math, parents' ratings of their child's competency in the relevant area, teachers' ratings of students' competency in the relevant area, and gender. In all grades (except 3rd- to 5th-grade math), achievement in the *previous grade* predicted children's ratings of their own academic ability. Interestingly, parent ratings in 3rd grade predicted children's ratings of literacy and math skills in 5th grade. In sum, academic skills were the most consistent predictors of children's judgments of their academic competence.

While the studies referenced above hint at the importance of prior achievement in explaining academic self-concept, one recent and important study by Stringer and Heath (2008) provided very strong evidence that the predictive ability of self-concept becomes modest when measures of prior achievement are included in analyses. In a sample of 155 students (mean age of 10 years, 7 months), they found that, initially, self-perceptions of academic competence were moderately predictive of academic performance 1 year later, accounting for roughly 16% to 25% of academic achievement. But, when measures of prior achievement were included, the amount of the variance explained by self-concept dropped dramatically. The strongest contribution this study makes to the causality argument is the inclusion of measures of change in achievement. Stringer and Heath argued that if, self-concept were causal to academic performance, we would expect that self-concept should not only predict achievement, but also predict changes in achievement. In this sample of students, self-perceived competency ratings did not predict change in achievement between Time 1 and Time 2. The evidence reported by Stringer and Heath suggests that academic self-concept may not play a simple role in helping to explain academic achievement.

Overwhelmingly, the evidence suggests that self-concept and achievement are positively related. The causal ordering question remains unsettled, and strong evidence exists to suggest that self-concept cannot play a simple causal role in explaining academic achievement. The question then becomes whether other variables might play a role in this relationship. A few studies reviewed here point to some potentially important mediating variables. Bouchey and Harter (2005) suggested that *adult perceptions of competence* and *scholastic behavior* may help explain the relationship between self-concept and achievement. These authors presented data indicating that students' perceptions of what adults think and do predict their own self-perceptions and their current performance, even when prior academic achievement is controlled. So adult perceptions appear important, but are not often included in self-concept studies. Scholastic behavior may also help explain the self-concept–achievement relationship. In one model tested by Bouchey and Harter (2005), *scholastic behavior* (whether a student completed homework on time and how much energy was put into the school work) was significantly predicted by self-concept. In this model, scholastic behavior also predicted school grades. While the data were not longitudinal, and only a small set of potential relationships between self-concept, scholastic behavior, adult perceptions of competence, and achievement were tested, this study points toward additional potential mediators not often included in studies of academic self-concept.

As noted in a prior section, Buhs (2005) suggested that *classroom engagement* could be an important factor in understanding the self-concept–achievement relationship. While engagement did not fully mediate the relationship between self-concept and achievement in the Buhs study, the connection among self-concept, engagement, and achievement is clearly plausible. Students' academic self-concept lowers their engagement in class, which in turn results in lower performance on measures of academic achievement. The linkage between engagement and performance has considerable support in the literature (e.g., Furrer & Skinner, 2003; Stipek, 2002).

5.5.2 Gender and Self-Concept

Gender differences in self-concept development are well documented and generally point to similar conclusions. Simply, girls seem to have a lower self-concept than boys (Young & Mroczek, 2003), but this may be different across different subjects. In math, several studies reviewed here found that boys had significantly higher math self-concepts (Ireson & Hallam, 2005; Marsh & Ayotte, 2003). Some researchers have identified a gender gap through grade 10 and a subsequent narrowing thereafter (De Fraine et al., 2007). Furthermore, girls often score higher on achievement tests than boys, although this does not translate into higher self-concepts in math or language (Hay et al., 1998; Marsh et al., 1985; Herbert & Stipek, 2005).

Linver and Davis-Kean (2005) showed how self-concept ability can help protect against grade declines, which are experienced by many students in high school. For high-ability girls in their study, a higher self-concept of ability for girls was associated with a less steep decline in grades over time.

5.5.3 Changes in Self-Concept over Time

Research has provided significant evidence about how self-concept changes over time. Most studies find that academic self-concept declines through adolescence (De Fraine et al., 2007; Ireson & Hallam, 2005; Zanobini & Usai, 2002; Gonida et al., 2006; Eccles et al., 1993; Stipek & MacIver, 1989). But, as children grow older, academic self-concept may also become more stable and reliable (Guay et al., 2003). On the question of the relationship between self-concept and achievement, specifically on the strength of the association over time, the results appear mixed. Guay et al. (2003) suggested that self-concept becomes more strongly associated with academic achievement outcomes over time, but this contrasts with De Fraine et al. (2007), who found that the association between academic self-concept and language achievement becomes weaker with age. In this study of Dutch high school students, the association between academic self-concept and achievement at the individual level is rather strong at the start of high school. By the end of high school, however, this relation is much weaker, especially for girls.

5.6 Discussion

This chapter has examined conceptual definitions of academic self-concept, the major instruments used to measure self-concept, and some important findings that could have practical implications for educational practice. Conceptually, academic self-concept has distinct components. One component, often called global self-concept, describes a student's self-beliefs about one's overall ability in school. A second component of self-concept describes a student's domain-specific feelings of competence in a particular subject matter. Math and reading are studied most, but recently, a small number of researchers

may have identified a science domain, as well. Not surprisingly, academic self-concept, be it global or domain specific, is positively related to important academic outcomes like test scores and grades. Still, both in terms of the causal ordering of self-concept and achievement and the actual strength of the relationship, the results are not conclusive.

First, from the studies reviewed here, it is difficult to find strong support for a causal relationship between academic self-concept and achievement for at least two reasons: (1) the analytic approach (path analysis) chosen by most researchers in this area and (2) a potential specification issue with models predicting academic achievement. Marsh and his colleagues (year?) investigated the causal ordering of self-concept and achievement over a series of studies, often concluding that there is evidence for the reciprocal effects model—the causal pathways work from academic self-concept to achievement and vice versa. But the choice of path analysis, which Marsh and colleagues exclusively chose in the studies reviewed here, makes it very difficult to answer questions about causal ordering. While path models do reflect hypotheses about causation, ultimately path analysis deals with correlation, not causation of variables. Path analysis suggests which of the multiple theoretically derived models are most consistent with the pattern of *correlations* found in the data. This is not to say that the path coefficients, which Marsh and colleagues used to draw inferences about the strength and direction of relationships, are uninteresting. In fact, they are quite interesting; but, they do not provide very conclusive evidence about causation. Stringer and Heath (2008) recently showing how self-concept is a weak predictor of *change* in achievement, the existence of a causal pathway from self-concept to academic achievement is equivocal.

Second, in the studies reviewed here, there are few strong tests of the relationship between self-concept and achievement because of a lack of sufficient control variables. In educational research, there is an exceedingly long history of research on the covariates of academic achievement, and it appears rare that many of these are included in analyses. There are a few exceptions (some measures of family influences, for example), but for the most part, the models attempting to explain achievement with self-concept as an independent variable do not include some fundamental covariates of student-level academic achievement. However, it is laudable that many studies in this review do control for prior achievement, which usually accounts for a large part of the variability in student-level achievement. This is clearly an area in need of improvement in this literature. If more statistical controls were included, it would go a long way toward determining whether self-concept strongly influences student achievement or if it simply exerts small influences.

Finally, the lack of a wide range of academic outcomes, other than grades and test scores, compromises the literature's ability to illuminate the true relationship between self-concept and academic achievement. Test scores and grades are the academic outcome of choice, and with good reason. But it makes good theoretical sense to argue that other important academic outcomes, like dropout rates, retention rates, and postsecondary entry rates, might be the outcomes on which you could expect self-concept to have strong influences. Logically, the better students feel they perform in school, the less likely they might be to drop out. This seems to be a testable proposition, and surely other testable propositions on academic outcomes other than grades and test scores could be developed. Such hypotheses have not been examined in the literature thus far, and perhaps because the educational

outcomes literature is not well integrated into the academic self-concept literature. Integrating the two disciplines is a worthy goal.

Measurement issues in this literature appear fairly uncontroversial. A few instruments are used widely and, while beyond the scope of this review, appear to have strong psychometric support in the wider literature. Even researchers who do not use the most common instruments choose items to measure self-concept that are nearly identical or very closely related to items on, for example, the SDQ. Furthermore, while the nature of academic self-concept probably necessitates a self-report measurement approach, student self-reports appear to be used exclusively in this literature. No research reviewed here attempts to measure self concept *behaviors*, for example.

Finally, the link between self-concept and achievement might be better explained if other noncognitive constructs were considered in this relationship. While many possible connections could be investigated, one that seems to hold promise would be that between achievement, self-concept, and the expectancy value theory of motivation. Expectancy value theory emphasizes that as a child's expectations to do well in school improve, so will the child's academic achievement in school. Self-concept may have an important role to play in explaining how expectations for success relate to academic outcomes. Academic self-concept and expectations for success are often measured in surprisingly similar ways. For example, a common expectancy value question might be, "I expect to do well in math." A common math self-concept question might be, "I am hopeless at math." These questions are clearly related so, for some, the distinction between the two may be unclear. But, if self-concept and expectations for success are distinctly separate constructs, they could very well work together to explain academic outcomes. For example, Eccles and Wigfield (2002) hypothesized that the self-concept of one's abilities is an important precursor of expectations of success, and expectations of success are directly related to academic achievement outcomes. While more work is necessary, there does appear to be a clear overlap between self-concept and important elements of achievement motivation.

5.7   References

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Antisocial and Prosocial Behavior

Author: Ben Dalton

6.1 Introduction

Unlike studies of many other noncognitive skills or behaviors, research on antisocial and prosocial behavior has a fairly unified focus and fewer competing theoretical perspectives. There is broad implicit agreement about the ways to measure antisocial behavior (particularly aggression) and some consensus on what prosocial behavior refers to. While some researchers approach antisocial and prosocial behavior through specific theoretical lenses, most work in this area is empirically driven.

The original mandate for this discussion was to examine aggression specifically, but because aggression is closely intertwined with studies of general antisocial behavior, and because antisocial behavior and prosocial behavior are closely related, our review was expanded to include discussion of these factors.

6.2 Methods

This review addresses peer-reviewed literature on antisocial and prosocial behavior published between 1997 and 2008. The works were limited to 40 journal articles that appeared in the major educational and psychological journals during the identified time frame. The basic search process was similar to that described earlier, with searches conducted by journal for articles containing the keywords "aggression," "antisocial," "prosocial," and "achievement." In addition to the journal list referenced in Appendix A, we conducted a broader search within additional journals that are key sources for research; these journals included *Child Development, Developmental Psychology, Journal of Emotional and Behavioral Disorders*, and *Journal of School Health*. Among the approximately 100 articles returned by these searches, a number were eliminated that (1) invoked antisocial behaviors or prosocial behaviors but did not include a measure or analysis of them, (2) were not methodological in study approach (e.g., discussions of individual student experiences in a psychiatric mode), (3) were small-scale studies outside of the United States with unique populations, and (4) were intended as research guides (such as for classroom management) and not original research reports. This yielded a group of 40 articles.

6.3 Conceptual Definition

Antisocial behavior is most commonly understood as consisting of both physical acts (violence to others or to objects in the environment, disruptive or purposively distracting actions) and nonphysical acts (exclusion, rejection, humiliation, any form of verbal abuse) (Bandura, 1973). These are seen as aggressive behaviors, whether physical or relational, in that they are intended to be felt and/or noticed by the victim or onlookers. Antisocial behavior is most closely identified both with aggression (as defined above) and with a specific form of aggression—bullying (Olweus, 1993; Dake, Price, & Telljohann,

2003). Bullying has been described as a "subcategory of aggressive behavior characterized by imbalance of power and continuous intention to inflict injury or discomfort" (Andreou & Metallidou, 2004, p. 28).

In addition to aggressive acts, antisocial behavior can involve forms of "dismissal," or more subtle/passive forms of ignoring, refusal to cooperate or help, hoarding, and withdrawal. Both aggressive and dismissive behavior share the common intention of inflicting emotional or physical pain on recipients. Some researchers (e.g., Cohen & Prinstein, 2006) include risky behaviors as part of the repertoire of reckless actors. The current review does not consider risk-taking behaviors to be antisocial behaviors per se, and, thus, does not consider them further unless explicitly linked in a work of antisocial research. Antisocial behavior, therefore, is distinct from other forms of deviance, such as delinquency, truancy, or criminal acts, in that it is defined by social interaction.

Prosocial behavior represents the opposite pole of social relating and includes active behaviors that indicate positive social feeling and inclusiveness, including cooperation, sharing, helping, providing leadership, expressing empathy, providing verbal support or encouragement, and general friendliness or kindness. There is a greater variety of behaviors viewed as indicating prosocial activity, but the research tends to gravitate toward cooperative and helping behaviors and typically does not include general social civility or considerateness. For example, in the articles reviewed for this project, friendliness/kindness was only adopted as a measure of prosociality by two sets of authors, and both also included indicators of helpfulness in their research (Veronneau, Vitaro, Pedersen, & Tremblay, 2008; Wentzel & Caldwell, 1997).

Though they may be indicators of larger problems, antisocial behaviors are distinct from diagnostic disorders such as antisocial personality disorder or conduct disorder and from other disorders that can relate behaviors (even excessive prosocial behaviors leading to, for example, manipulation and lying) to an entire program of behavioral problems. These disorders, their etiology and effects, are studied separately. Nevertheless, antisocial behaviors expressed early in childhood can lead to increased risk of disorders (Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003).

Antisocial and prosocial behaviors are also distinct from behaviors that are principally reactions to the social actions of others such as compliance (i.e., following requests or directions) (Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006), as well as from general concepts of social competence and peer acceptance, which reflect social skills or social position rather than positively or negatively valenced behaviors (Hoglund & Leadbeater, 2004). However, some researchers treat antisocial and prosocial acts, as well as measures of social status and social self-concept, as variations on general social adjustment; this is more often the case when contextual influences on behavior are the main focus of research (Chen, Rubin, & Li, 1997; Ryan & Shim, 2008).

Antisocial behavior, particularly in its more severe and persistent forms, is typically characterized as the product of dislocating experiences, poor internal regulation, and undeveloped relational abilities and perceptions (Dodge, 1986; Ladd, 2005). For example, one model of aggressive behavior, social information processing, defines how individuals process social cues and determine reactions to others' behaviors (Crick & Dodge, 1994), utilizing emotional reactions as well as beliefs in forming attributions and determining response (Lemerise & Arsenio, 2000). These beliefs, for example, are considered

maladaptive if a student or child tends to view any sort of disruptive or harmful activity (even if accidental) as representing malicious intent on the part of another.

6.4 Studies of Antisocial and Prosocial Behavior and School Performance, 1997–2008

Studies of antisocial and prosocial behavior have a pedigree of several decades. The focus here is on recent findings about the relationship between anti/prosocial behavior and academic outcomes, variations in this relationship across major groups such as grade level, gender, and race/ethnicity, measures recently used, and directions the research agenda is pointing. Before the substantive findings are described, this section first discusses the range of methodologies employed and the types of measures used among the 40 reviewed articles.

6.4.1 Methodologies Employed

Recent research into aggression, other antisocial behaviors, and prosocial behaviors have a pronounced methodological and substantive focus. Generally, this research tends to employ geographically restricted samples, include a focus on aggression, utilize multiple measurement techniques, and focus on the relationship between aggression or prosocial behaviors and their antecedents rather than between social behavior and academic outcomes. Table 6-1 tabulates some of these characteristics of the reviewed studies.

A majority of the reviewed research (26 articles) used sample that were smaller than 500 children or students, and only three of the studies used a national-level sample that could be reasonably generalized to a broad swath of the U.S. population. The national samples included one based on the U.S. Department of Education's National Education Longitudinal Study of 1988 (Marsh et al., 2001) and two others based on multi-regional independent studies (Odom, Zercher, Li, Marquart, Sandall, & Brown, 2006; Stormshak, Bierman, Bruschi, Dodge, Coie, and the Conduct Problems Prevention Research Group, 1999). The large majority of studies (including the international studies) focused on samples that were drawn from specific cities, states, or regions, sometimes additionally being restricted to or only comprised of specific populations such as minorities. About half of the studies (21 articles) were longitudinal while 17 were cross-sectional, and 2 were experimental (involving the use of short time-spans).

In terms of outcomes, the large majority of articles (37 articles) included an examination of antisocial behavior or attitudes, regardless of whether prosocial behaviors or attitudes were included. Twenty-four studies exclusively focused on aggression or other antisocial tendencies, while 13 studies included both antisocial and prosocial behaviors or attitudes as part of their analysis. A small group of studies (3 articles) focused on prosocial behaviors exclusively.

6.4.2 Measures of Antisocial and Prosocial Behavior

Table 6-2 presents characteristics of some of the most common scales/questionnaires used in the reviewed studies (since most of the instruments measuring aggression rely on some variant of a questionnaire, and the relationship between the reported instrument and the original or source is not

always clear in the reviewed articles, only these examples are presented here). Table 6-2 also lists other named instruments that were unique to specific studies.

Table 6-1.   Approaches to Studies of Antisocial and Prosocial Behavior

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	4
Elementary	15
Middle	8
High	4
Multiple	9
What is the time frame of the study?	
Cross-sectional	19
Longitudinal	21
What is the method of analysis?	
Case study	2
Bivariate	5
Multivariate	31
Multilevel	2
Is the sample generalizable?[a]	
Sample of convenience (an existing intervention program)	1
Students identified as at risk	1
Within school	6
Within district or region	31
Nationally representative	3
Can study be replicated?	
Data and survey are available	1
Questionnaire is available	33
No, neither data nor survey are available	6

[a] The first two rows in this category refer to characteristics that overlap with the last three categories (i.e., are not exclusive).

The majority of studies (33) used questionnaire-based methods (of students, teachers, or parents) to measure social behaviors. Among studies that did not use questionnaires were experimental studies (for example, one using a computer-based interactive program for eliciting student responses [Cohen & Prinstein, 2006] and one using puppetry with preschoolers [Thornberg, 2006]), a study using juvenile disciplinary and court records (Schaeffer et al., 2003), and studies using researcher observations (Giles & Heyman, 2005; Goldstein, Arnold, Rosenberg, Stowe, & Ortiz, 2001; McComas, Johnson, & Symons, 2005; Odom et al., 2006; Pellegrini & Bartini, 2000).

However, a substantial proportion of studies used multiple sources or methods to measure student behavior. Several of the studies employing researcher observations also included standardized questionnaires. Among studies that were entirely questionnaire based, about 12 used information from two or more of the following sources: the student, peers, teachers, or parents. Close to half of all studies used information from the teacher and/or information from peers (20 and 16 studies, respectively,

Table 6-2.   Measures of Antisocial and Prosocial Behavior[a]: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Revised Class Play Instrument	Student (peers)	Physical aggression, verbal aggression, prosocial cooperation/helpfulness	Varies	3	Elementary to middle school	Becker & Luthar (2007)
Interpersonal Competence Scale	Teacher	Physical aggression, verbal aggression, cooperation, withdrawal, other noncognitive (e.g., social anxiety)	Varies	3	Elementary to middle school	Ryan & Shim (2008)
Teacher Observation of Classroom Adaptation—Revised Scale (TOCA-R)	Teacher	Physical aggression, verbal aggression, prosocial cooperation/helpfulness	Varies	2	Elementary	Schaeffer, Petras, Ialongo, Poduska, & Kellam (2003)
Teacher-Child Rating Scale (T-CRS)	Teacher	Acting out/disruptive behavior, helpfulness, other noncognitive skills (e.g., self-concept)	Varies	2	Elementary	Morrison, Robertson & Harding (1998)
Safe Communities-Safe Schools Survey	Student (self), Teacher	Individual items (attitudes toward aggression, victimization)	Varies	2	High school	Wilson (2004)

[a] Other questionnaires or scales used: Preschool Behavior Questionnaire, Social Behavior Questionnaire, Child Behavior Checklist, Child Behavior Scale, Early School Behavioral Rating Scale, Youth Self Report, Prosocial Goal Pursuit Questionnaire, and various unnamed peer-nomination procedures.

nonexclusive). Ten studies used reports from the target students themselves (again, nonexclusive with other sources).

The teacher and self-student–based questionnaires (and the rarer parent questionnaires) were typically drawn from preexisting batteries, particularly the Teacher Observation of Classroom Adoption—Revised scale (TOCA-R) or teacher ratings on the Interpersonal Competence Scale. For student self-ratings, scales included the Interpersonal Competence Scale, the Child Behavior Scale, the Child Checklist, the Social Behavior Questionnaire (given similarity in names, some of these scales may have common origins that were not clear from the pattern of citations), and the Prosocial Goal Pursuit Questionnaire.

Peer-nomination procedures were perhaps the most unique methodology employed (compared with studies of other noncognitive skills), and nearly as common as teacher reports. In a peer-nomination procedure, students or classmates are provided with a roster of names and rate their peers on various aspects of each peer's behavior, how the respondent feels about the peer, and other perceptions about the target student. One of these instruments was the Revised Class Play Instrument (Masten, Morison, & Pellegrini, 1985), which provided students with a list of behavioral descriptors and a roster of class names, then asked the students to nominate up to three students who could best play a role corresponding to that description in a hypothetical class play (Chen, Rubin, & Li, 1997). This procedure serves as a nonthreatening and subtle way to solicit peer judgments, especially for elementary-aged children who may have difficulty thinking directly about the social behaviors typically exhibited by classmates. Peer nomination is also useful for generating rich data about the overall classroom climate related to antisocial and prosocial behavior and as perceived by students themselves (this perception often being a critical component of the purported influence of anti/prosocial behaviors). Peer-nomination procedures are also easily extended to include measures of peer acceptance, peer admiration, friendships, and networks (see, e.g., Wentzel, Barry, & Caldwell, 2004)

In terms of specific questions, questionnaires may ask about a number of individual acts. For aggression, questionnaires might ask about the frequency of hitting, kicking, fighting, yelling, swearing, disrupting lessons, threatening, and stealing. For relational aggression, studies may ask about excluding others, spreading rumors, or abandoning plans with others. Dismissive behaviors such as ignoring, hoarding, and refusing to help also may be asked about directly. For prosocial behavior, questions might ask about the frequency or likelihood of helpfulness, sharing, cooperation in scholastic or nonacademic tasks, and providing leadership.

In sum, the measurement of antisocial behaviors and prosocial behaviors is generally straightforward and relatively direct, except for the use of peer-nomination procedures. The major issue for the measurement of antisocial behaviors has to do with visibility. Aggressive actions often take place away from parents, teachers, and other authorities (Hyman, Kay, Tabori, Weber, Mahon, & Cohen, 2006). Teacher reports, though widely used, may miss many aggressive actions because of this fact. Pellegrini and Bartini (2000), for example, noted that researcher observations and teacher reports had low correlations on some aggression measures with direct student or peer reports of the same group of students (Pellegrini also noted problems with student diaries). Teacher reports may be most useful when the in-classroom environment and teacher-student interactions are key to the study. Researcher

observations may be most useful in environments where all or nearly all social interactions can be captured and/or sampled (for example, in videotaping a preschool class both indoors and at playgrounds). However, self-report and peer-nomination procedures are likely valid for most research.

6.4.3 Substantive Focus and Findings

The studies reviewed here mostly focused on antisocial or prosocial behaviors as outcomes that were influenced by other noncognitive skills, including other socially relevant factors like popularity or social competence, as well as, in one case, achievement itself. This group comprised 24 of the studies reviewed. Two studies examined other predictors of anti/prosocial behaviors, including religious involvement and parental involvement.

Eleven studies examined anti/prosocial behaviors as predictors of educational outcomes. The focus of these studies was broadly distributed in examining achievement test scores, grades (from school transcripts), school completion, educational status at age 30 in one case, and teacher-rated academic skills in another case. Another small group of studies (five of the reviewed pieces) examined anti/prosocial behaviors as predictors of other noncognitive skills or social status measures (e.g., Becker & Luthar, 2007).

Thirty-one of the studies of antisocial measures found that antisocial behavior had negative associations with academic achievement; social behaviors; or family, school, or classroom/teacher experiences (whether antisocial behavior was deemed a predictor, outcome itself, or correlated in an indeterminate way). Two studies showed no associations between antisocial behavior and other experiences or characteristics (Gest, Domitrovich, & Welsh 2005; Wentzel & Caldwell, 1997), and another three studies showed positive relationships between antisocial behavior and positive characteristics or experiences—in the latter case, this usually involved a relationship between aggression and popularity (discussed further below).

The prosocial behavior findings were even more stark: all studies involving prosocial behaviors as an outcome or predictor showed positive associations with positive social and academic skills or characteristics such as literacy comprehension, school completion, friendships, peer acceptance, and occupational status. There were no studies reporting no or negative relationships for prosocial behaviors.

The small number of studies that directly addressed the relationship between antisocial behaviors and achievement as an outcome makes consistent conclusions difficult. The best studies were longitudinal and suggested that the relationship between antisocial behavior and educational outcomes was more complicated, and perhaps reciprocal, than a straightforward causal impact on behavior on achievement or attainment.

For example, some of the antisocial behavior results include the finding that aggressive and disruptive behavior in 4th grade predicted poor math achievement among 6th graders in China (Chen, Rubin, & Li, 1997). Schwartz, Gorman, Nakamoto, and McKay (2006) found that aggression was strongly and negatively related to GPA and strongly and positively related to class absences over 2 years in high school, both directly and through an interaction of enhanced popularity (aggression associated with increased popularity, which, in turn, positively predicted class absences and negatively influenced

grades). Dubow et al. (2006) found that, having followed 3rd graders from Columbia County, New York, for nearly 30 years, aggression at age 8 predicted educational status at age 30, which in turn affected occupational status at age 40. Likewise, another longitudinal study showed that high school completion was lower among students who were high aggressors-disruptors in elementary school, and that this effect operated through lowered academic achievement and lower school commitment in high school (Veronneau et al., 2008).

In contrast, Vitaro, Brendgen, Larose, and Trembaly (2005) found no relationship between their elementary-age aggression measures and high school completion once parental practices were accounted for; in contrast, hyperactivity-attention problems were positively related to dropping out of high school. Likewise, Miles and Stipek (2006) found no association between earlier aggression and later achievement; however, they did find that poor academic achievement in early grades was predictive of aggression itself, consistent with the hypothesis that school failure may increase feelings of disengagement, frustration, and compensating behaviors.

These conflicting findings make more sense when findings on the nonacademic outcomes of antisocial behavior are considered. Here, antisocial behavior, and particularly aggression, generally alienates friends and peers, reduces overall social competence, and is a risk factor for other emotional problems and delinquency (Schaeffer et al., 2003). For example, Ladd and Burgess (1999) found that aggressive elementary school children were more likely than nonaggressive children to report poor teacher and peer relationships, including being lonely, disliked, and victimized. Aggressive and withdrawn students reported even more severe problems (although just being withdrawn was not associated consistently with relationship problems). Similarly, Hoglund and Leadbeater (2004) reported that physical aggression and disruption were related with declines in social competence and an increase in emotional problems. In terms of risks for delinquency, aggressive and unpopular boys were more likely to join aggressive groups that nonaggressive or aggressive and popular boys (Farmer, Leung, Pearl, Rodkin, Cadwallader, & van Acker, 2002).

Yet, in a superficially contradictory finding, researchers reported that aggressive behavior had the paradoxical effect of increasing popularity among boys, though not necessarily among girls (Becker & Luthar, 2007). For example, Marsh et al. (2001) noted that self-identities of "troublemaker" were associated with slight increases in self-esteem for high school boys. The previously mentioned Schwartz et al. (2006) study found that popularity and aggression interacted to increase the effect of aggression in producing poor grades; likewise the Farmer et al. (2002) study noted that popularity played a role in whether boys joined aggressive groups. Other suggestive evidence comes from an experimental study showing that children are often swayed by high-status peers to support aggressive or risky behaviors (Cohen & Prinstein, 2006).

In an extended discussion of bullying, Hyman et al. (2006) noted that bullies are often popular and socially skillful individuals with high self-esteem. This contradiction with other research is partially resolved by considering the fact that more problems arise when bullies (or less-consistent or personal aggressors) simultaneously occupy the role of victim or are alienated or withdrawn from social groups in school. These "bullies/victims" or "aggressive-withdrawn" students are more likely to have maladaptive

social behaviors and low self-esteem (Andreou & Metallidou, 2004; Brockenbrough, Cornell, & Loper, 2002; Ladd & Burgess, 1999).

The weight of findings on antisocial behaviors' effects suggests that aggression and other negative sociality may operate through altering social relationships and social supports, both in positive and negative ways depending on the group (e.g., boys versus girls) and social context. Indeed, aggression is associated with a host of contextual and social antecedents such as parental involvement, religious involvement, classroom-wide behaviors, and after-school activities (Coley, 1998; French, Eisenberg, Vaughan, Purwono, & Suryanti, 2008; Goldstein et al., 2001; Morales & Guerra, 2006; Lord & Mahoney, 2007; Morrison, Robertson, & Harding 1998), although influences related to family and personal friendships may matter more than broader contexts such as the whole school environment (Wilson, 2004). In this scenario, further work that theorizes and develops methods to study the integrated relationships among causes of antisocial behavior, the behavior itself, social consequences, and academic consequences will be required to orient research beyond contextually sensitive examinations of internal and social psychological processes.

In many of the studies cited above, prosocial behaviors were measured along with antisocial behaviors. In nearly every case, prosocial behaviors had an inverse relationship to causes or outcomes compared with antisocial behaviors. Thus, prosocial behaviors are affected by reciprocated friendships, religious involvement, paternal involvement, and even achievement itself (e.g., Barry & Wentzel, 2006; Chen, Rubin, & Li, 1997; French et al., 2008; Wentzel, Barry, & Caldwell, 2004). The prosocial literature, however, has focused more clearly on the ways that prosocial intentions (goals) help produce prosocial behaviors. For example, Wentzel, Filisetti, and Looney (2007) noted that having prosocial goals (e.g., how often a student tried to share with others) was a positive predictor of prosocial behaviors like cooperation and sharing, even when controlling for other variables like peer expectations that were stronger influences on behavior. Ryan and Shim (2008) noted that social goals predicted both prosocial behaviors and declines in aggressive behaviors, but that the type of social goal could matter—indeed, social demonstration approach goals (striving to be popular, liked, or respected) were positively associated with aggressive acts. This last finding supports the conclusions of the antisocial behavior analyses: social behavior has clear antecedents in background experiences and situational factors and it is linked to academic outcomes through other interpersonal relationships, which, themselves, can both help and hinder school success.

6.4.4 Links between Antisocial/Prosocial Behavior and Other Noncognitive Skills

Antisocial and prosocial behaviors possess suggestive links to other noncognitive skills and behaviors, including self-efficacy, self-esteem, coping (particularly for victims), and self-regulation. The relationships between these skills and behaviors and social behaviors are complex and reciprocating. Most often, studies examining antisocial or prosocial behaviors have also looked at social competence; peer acceptance or rejection; stressors; and psychological problems such as depression, anxiety, hyperactivity, and attention problems. Theoretical and empirical work has linked social competence generally to the process of information processing, in which children assign reasons to the acts of others, consider how those reasons relate to their own internal self-judgments, and act accordingly (Andreou & Metallidou,

2004; Ang & Yusof, 2006; Dodge, 1986; Crick & Dodge, 1994). This perspective accords with ideas developed in the self-regulation and motivation research literature.

Nevertheless, analysis of the links between antisocial or prosocial behaviors and key noncognitive skills like motivation, engagement, and effort was rarely observed in the current review. Anti/prosocial behavior was far more likely to be examined as part of a process of friendship formation, social development, and social and academic self-concept construction. Further research could profitably explore how specific antisocial and prosocial behaviors relate to academic outcomes through measures of student relationships and social integration. This research may be more analytically and data demanding, which would explain its relative paucity in the last 10 years.

6.5   Discussion

Hyman et al. (2006) noted that true school violence is a rare occurrence, but harassment, exclusion, and milder physical abuse are common experiences in schools. They are most likely to take on urgency when accumulated forces produce particularly severe or even pathological problems within students or schools, but milder forms repeated over time can contribute to stable and negative identities and thought patterns that have long-term consequences (Wilson, 2004). Therefore, common antisocial and prosocial behaviors assume a greater importance than they might be granted otherwise.

In terms of measurement challenges, the anti/prosocial literature generally coalesces around the same understanding of what counts as aggression or prosocial activity, and strongly leans toward both peer-nomination and teacher reports of behaviors as appropriate ways to measure them. The relatively equal weight given to these measures in the recent literature, the still prevalent use of student self-reports, and the not uncommon use of multiple measures in the same study suggest that one best method may not be appropriate for research in this area. Teacher reports may be most salient in classroom-oriented studies, while student self-reports may be appropriate when the focus includes other components of internal psychological processes. Peer-nomination procedures certainly provide both individually specific and contextually broad data, but they may be limited by the numbers of peers that any individual student can report on—there is an inherent likelihood that significant social interactions occur between students who are not naturally grouped in classrooms (or even schools) that are the base for peer-nomination methods.

The literature on antisocial and prosocial behavior starts from a position of having consistently demonstrated that these behaviors matter in the production of educational outcomes. The conceptual and theoretical challenges of this research are partially grounded in the measurement, because comprehensive understanding of the links between antisocial and prosocial behavior, background experiences, social relationships, and academic results requires significant data collection efforts across a range of constructs.

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Coping and Resilience

Author: Elizabeth Glennie

7.1 Introduction

Research on coping and resilience covers a range of skills used to respond to various stressors. All students face stress at some point during school, whether through pressure to do well in a class or through experiencing unpleasant interactions with other students or teachers. Some students face particularly difficult challenges of poverty, academic struggles, or family or neighborhood disruptions. Studies of coping examines the skills students use to cope with stress, while studies of resilience focus on the ways in which at-risk students succeed academically. This review presents the definitions of these terms, the ways in which they have been measured, and their associations with academic outcomes.

7.2 Methods

The first task for this section involved scanning the literature to identify recent publications on coping and resilience. Search terms included "coping and achievement," "coping and ability," "coping and school," and "resilience and achievement." We then limited those articles to empirical research that either discussed ways of measuring the construct, used the construct as a predictor of academic achievement, or both. As in other sections of this report, student coping and resilience had to be measured at the student level at some point between preschool and 12th grade. Studies that focused on parental or educator coping skills were excluded. Studies examined the following academic outcomes: grades; scores on math, reading, or science exams; and teacher perceptions of a student's academic competence. Studies addressing nonacademic outcomes such as depression or psychological distress were only included if they considered these academic outcomes as well. As this research synthesis focuses on noncognitive skills and academic outcomes in the United States, international studies were excluded except for one that used an instrument developed and used in the United States. This approach yielded 20 articles for this review.[5]

7.3 Conceptual Definition

Coping refers to a range of strategies that help people respond to various challenges. These are not fixed qualities within an individual—people can develop skills, and students may use different strategies depending on their age or the specific stressor they face. Coping skills include both positive and negative responses to stress, and this range of skills includes attitudes, behaviors, and relationships. Resilience refers to academic success in spite of various risk factors. Thus, a study of coping might focus on whether students respond to a stressful math class by asking for help. A study of resilience might identify the low-income students who succeeded in the math class, categorize them as resilient, and might examine the factors that helped them succeed relative to other low-income students.

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[5] One article had more than one study. Each one used a different sample and method and was coded separately. Thus, the total number of studies was 21.

Table 7-1 shows examples of different types of coping strategies and the risk factors associated with studies of resilience. While studies of coping tended to sample students within a grade, school, or district, studies of resilience reviewed here focus on populations of at-risk students. Risk factors include demographic characteristics, in which members of a given group score, on average, lower than those in a comparison group. These include racial/ethnic minority status, poverty, and gender (Gayles, 2005; Kanevsky, Corke, & Frangkiser, 2008; Von Secker, 2004). Other studies have categorized high-risk students as those with a learning disability (Sorensen et al., 2003); low scores on a literacy exam (Kwok, Hughes, & Luo, 2007); or attending a high-poverty, academically struggling school (Shin, Daly, & Vera, 2007). Family traits, such as having mothers with serious psychological disorders, also constitute risk factors (Garber & Little, 1999).

Table 7-1.   Examples of Coping Strategies and Definition of Resilience

Classification	Trait or Strategy
Individual coping—attitudes	Self-reliance Hopefulness Optimism
Individual coping—behavior	Seeking help Distracting oneself from the stressor Relaxing
Relational coping skills	Positive relationships with parents Positive relationships with peers
Maladaptive coping	Concealment Negative attitudes about academic success Withdrawal Substance abuse
Resilience—risk factors	Demographic characteristics Past academic performance

Whether focusing on positive attitudes and behavior, maladaptive behavior, or social relationships, almost all of the studies reported on here used surveys to solicit student reports of their responses to stress. However, no one scale predominated in these studies. In fact, each study used a different instrument, including the Adolescent Stress and Coping Measure, the Coping Response Inventory Youth Form, the Children's Coping Questionnaire, and the Coping Resources Inventory Scales for Educational Enhancement. Tables 7-2, 7-3, and 7-4 present the measures used in each study and include the measure name, the subscales, the number of items, and the intended population for the instrument. Table 7-2 reports the student surveys, Table 7-3 reports the open-ended interviews, and Table 7-4 describes the parent and teacher reports. In some cases, the number of items or the item content is not available in the article.

Most of the studies reviewed here used student surveys to measure coping and resilience (Table 7-2), and these surveys measure different coping, as skills described above, Turning first to attitudes, cognitive attitudes that help students cope include self-reliance, hopefulness, and optimism (e.g., Hawley et al., 2007; Huan et al., 2006; Jew et al., 1999). The Life Orientation Test measures dispositional optimism by having students agree or disagree with positively worded statements such as, "I'm always optimistic about my future," or negatively worded statements, such as "If something can go wrong for

Table 7-2. Student Surveys Used to Study Coping and Resilience

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Student surveys						
Adolescent Stress, Stressor, and Coping Measure from the State Trait Anxiety Inventory Form	Student	Relaxation Distraction Cognitive Control Help Seeking Affective Release Denial Withdrawal Confrontation Aggressive Behavior Substance Abuse (subscales created by author)	Not stated in study	1	Adolescents	De Anda et al. (2000); Instrument from Spielberger (1983)
Survey of Adaptational Tasks of Middle School (SAT-MS)	Student	Substance Abuse Peer Relationships Conflicts with Authorities and Older Students Academic Pressures.	28 total, subscales derived from factor analysis	1	Middle school students	Chung et al. (1998); Instrument from Elias et al. (1992)
Social Support Resources Measure	Student	Number of Supportive Relationships Number of Social Network Contacts Mutual Involvement with a Confidant (e.g., talking, helping) Allowance of Conflicting Expression (e.g., disagreement)	14 total from the Health and Daily Living-Youth form Subscales derived from summing components	1	Adolescents	Chung et al. (1998); Instrument from Moos et al. (1984)
Coping Response Inventory - Youth Form	Student	Take Problem Solving Action Positive Reappraisal Emotional Discharge Cognitive Avoidance	24 total in the short form, with 6 in each subscale. The full form has 48 items.	1	Adolescents 12 -18	Crean (2004); Instrument from Moos (1990)

Table 7-2. Student Surveys Used to Study Coping and Resilience (continued)

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Children's Coping Questionnaire	Student	Positive coping (e.g., see what I did wrong) Denial (e.g., don't think about it) Negative (e.g., plan to get back at them)	30 total	1	Not stated in study	Garber & Little (1999); Instrument from Mellor-Crummey et al. (1999)
Adolescent Coping Orientation for Problem Experience (A-COPE)	Student	Venting feelings Seeking Diversions Developing Self-Reliance and Optimism Developing Social Support Solving Family Problems Avoiding Problems Seeking Spiritual Support Investing in Close Friends Seeking Professional Help Engaging in Demanding Activity Being Humorous Relaxing	33 total	1	Adolescents	Hawley et al. (2007); Instrument from Patterson & McCubbin (1987)
Optimism scale from Life Orientation Test	Student	NA	8	1	Adolescents, adults	Huan et al. (2006);Instrument from Sheier & Carver (1985)
Resiliency scale (developed by authors)	Student	Optimism Future Orientation Belief in others Independence	15, 10, 6, 6	1	9th-grade students	Jew et al. (1999)

Table 7-2. Student Surveys Used to Study Coping and Resilience (continued)

Measure Name	Data Source	Subscales	No. of items	No. of Studies Using This Measure	Intended Population	Example Articles
Parental Attachment Questionnaire	Student	Affective Quality of Attachment scale Parental Fostering of Autonomy scale	26, 14	1	Adolescents	Kenny et al. (2002); Instrument from Kenny (1987)
Psychosocial characteristics Personal Development Survey (PDS) (authors)	Student	Character Academic self-concept Academic self-efficacy Attitude toward school	8, 7, 9, 9	1	Elementary school students	Kanevsky et al. (2007)
Coping skills related to academic difficulties	Student	Help seeking Concealment	5, 9	1	Students in grades 3-7	Marchand & Skinner (2007); Instrument from Skinner et al. (1998)
Coping Resources Inventory Scales for Educational Enhancement (CRISEE)	Student	Social Confidence Behavior Control Peer Acceptance Academic Confidence Family Support	99 total, unclear how many in each subscale	1	Students in grades 3-8	Nounopolis et al. (2006): Instrument from Curlette et al. (1993)
Social support coping	Student	Parent Support Coping Adult Support Coping	4, 7	1	Adolescents	Plybon et al. (2003); Instrument from Wills (1986)
General Attitude Toward School subscale of the School Sentiment Index	Student	NA	11	1	K-12	Shin (2007); Instrument from Frith & Narikawa (1970)

Table 7-2.   Student Surveys Used to Study Coping and Resilience (continued)

Measure Name	Data Source	Subscales	No. of items	No. of Studies Using This Measure	Intended Population	Example Articles
Protective factors in home, school	Student	Parental education (from NAEP) Home environment (composite measure from NAEP) Attitudes about science (author) Learning experience (author)	1, 4, 8, not stated in study	1	Grades 4, 8, and 12	Von Secker (2004); Instrument from National Assessment of Educational Progress

Table 7-3. Open-Ended Interviews Used to Measure Coping and Resilience

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Students' construction of the meaning of academic achievement	Student	NA	NA	1	High school seniors	Gayles (2005)
Coping strategies	Student	Individual Academic Social	NA	1	8th- and 9th-grade students	Newman et al. (2000)
Resilience - ability to develop positive personal characteristics, coded by authors from interviews	Student	NA	NA	1	High school students	Reis (2005)
Reactive coping attitudes - exaggerated stereotypical views of male behavior.	Student	Bravado	Not stated in study	1	High school males	Swanson et al. (2003); Instrument derived from Mosher & Sirking (1984)

Table 7-4. Parent and Teacher Reports of Student Coping and Resilience

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
California Child Q-set	Teacher	Ego resiliency Agreeableness Conscientiousness	7	1	Personality inventory for children designed for administration by nonprofessionals	Kwok et al. (2006)
Behavior Assessment System for Children (BASC)	Parent Teacher Student	Externalizing behavior Internalizing behavior Adaptive behavior	Un-clear	1	Separate versions for parents, teachers, students	Sorenson et al. (2003); Instrument from Reynolds & Kamphaus (1992)

me, it will" (Huan et al., 2006). Other studies combined different coping attitudes. Hawley et al. (2007) used the Adolescent-Coping Orientation for Problem Experience measurement tool, which permitted students to respond to questions about their attitudes using a Likert-type scale. Here, positive coping attitudes include self-reliance, optimism, and being humorous. De Anda et al. (2000) employed the Adolescent Stress, Stressor, and Coping Measure, in which students could respond to items about how frequently they used different coping strategies. Coping attitudes included cognitive control, which authors did not specifically define. Authors grouped items into scales based on an 89% agreement rate among a panel of independent experts, who included faculty members in social work. In another study, a resiliency scale (Jew et al., 1999) included items such as "No matter what happens in life, I know I will make it" (a measure of future orientation). Here, authors selected their items based on input from an expert panel that included psychiatrists, psychologists, and a social worker.

Four studies of coping attitudes focused on attitudes toward school or an academic subject. One of these studies analyzed items assessing students' feelings about school subjects and attending school (Kanevsky et al., 2008), while another examined the belief that one can do quality work in school (Nounopoulos, Ashby, & Gilman, 2006). Shin et al. (2007) used the General Attitude toward School subscale of the School Sentiment Index, which assessed student attitudes toward teaching, learning, school climate, and peers. A study examining science performance focused items that measure students' attitudes about science and their beliefs about their ability to do well in science (Von Secker, 2004). In these articles, the specific items used were not included. These attitudes toward school are conceptually similar to the noncognitive skills of academic self-concept and sense of control described in detail elsewhere in this report.

Student surveys of positive coping actions used similar methods asking students how often they took different actions in response to stress. The most frequently studied positive coping actions involved seeking help and getting more information. As noted above, de Anda et al. (2000) asked students how frequently they used certain coping strategies and classified help-seeking as an adaptive coping behavior. The Adolescent Coping Orientation for Problem Experience (Hawley et al., 2007) includes items for "seeking professional help" and "seeking spiritual support." Marchand and Skinner (2007) used a five-item scale for help-seeking, which included statements, such as "When I have trouble with a subject at school, I ask the teacher to explain what I didn't understand." Crean (2004) used a subscale of Take Problem Solving Action from the Coping Response Inventory. Similarly, Garber and Little (1999) used the Children's Coping Questionnaire, which asked students what they would do in different stressful situations and coded items about getting more information as positive coping behavior.

Not all coping strategies are positive. Maladaptive coping strategies are actions and attitudes that lead to negative academic or social outcomes. Maladaptive coping strategies include denying or concealing problems (Crean, 2004; Garber & Little, 1999; Marchand & Skinner, 2007) and using drugs or alcohol (de Anda et al., 2000). Most of these studies, as referenced above (Crean, 2004; de Anda et al., 2000; Garber & Little, 1999) used Likert-type scales where students could state how often they act in ways, such as "I make sure no one finds out" or "I plan ways to get back at them." Maladaptive coping strategies resemble some of the same patterns as aggressive or antisocial behavior examined elsewhere in this report.

Coping and resilience are not merely individual abilities—they also involve interpersonal skills and the development of supportive relationships, such as those with parents, other adults, or peers. Some studies focus on the quality of the relationship with parents. Kenny, Gallagher, Alvarez-Salvat, and Silsby (2002) distinguished two aspects of the strength of relationships with each parent using the Affective Quality of Attachment Scale, which included items like "My father is someone I can count on to listen to me when I'm upset," and the Parental Fostering of Autonomy scale, which included items like "My mother respects my privacy." Relationships with other adults can provide coping skills or resilience. Plybon, Edwards, Butler, Belgrave, and Allison (2003) differentiated between Parent Support Coping and Adult Support Coping, and items for these measures include being able to talk to a parent or other adult about a problem.

Relationships with peers can provide coping resources, as well. Nounopoulos et al. (2006) distinguished family support from peer acceptance. Chung, Elias, and Schneider (1998) had students report the number of supportive relationships they had and whether these relationships had mutual involvement (sharing, helping) and allowance of conflicting feelings (disagreements). Hawley et al. (2007) included questions about the frequency of "developing social support" and "investing in close friends" as measures of coping strategies for adolescents. Jew et al. (1999) examined the response to the single item "I can be loved by someone else than my family" (a measure of belief in others) as a predictor of academic success.

A few of these studies used open-ended interviews with students rather than surveys. Most of these focused on student attitudes such as the student's construction of the meaning of academic achievement (Gayles, 2005) or exaggerated stereotypical views of male behavior (Swanson, Cunningham, & Spencer, 2003). In these studies, authors collected stories about each respondent's experiences in high school. Newman, Lohman, Newman, Myers, and Smith (2000) asked open-ended questions about the strategies students used to respond to stress and categorized responses as individual (hard work), academic (studying), and social ("hanging" with the right crowd). Authors did not explain the difference between hard work and studying, or the process for classifying these responses into these broad categories. In another study, which used methods of interviews and participant observation over a 3-year period, Reis, Colbert, and Herbert (2005) identified various factors that may contribute to resilience.

Two of the studies reviewed in this report used teacher and parent observations rather than student reports. In a study of 1st-grade students, teachers assessed the students' ego-resilience, agreeableness, and conscientiousness using the California Child Q-set. Items in the ego-resiliency scale include four positively worded items, such as "curious" and "persistent," as well as three negatively worded ones, such as "rapid mood shifts." The agreeableness scale had nine items, including "is helpful and unselfish," while the eight-item conscientiousness scale included "does a thorough job" (Kwok et al., 2007). A study of learning=disabled students used the Behavioral Assessment System for Children (BASC), which has separate questionnaires for parents, teachers, and students (Sorensen et al., 2003). Parents and teachers reported their observations of child behavior, while students described their thoughts and feelings.

7.4   Studies of Coping and Resilience and School Performance, 1997–2008

7.4.1   General Methods of These Studies

Researchers have used varied approaches to analyze the influence of coping and resilience on academic outcomes. Table 7-5 categorizes studies according to the students' grade level and the source of information about the construct. Table 7-5 also summarizes whether constructs can be reproduced, their results can be generalized to other populations, and their methods permit asserting causality between the construct and the academic outcome. Note that even more sophisticated methods may not necessarily prove claims of causality.

Table 7-5.   Approaches to Studies of Coping and Resilience

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	0
Elementary	4
Middle	6
High	7
Multiple	4
What is the source of information?	
Student report	18
Teacher report	1
Parent report	1
Researcher observation	1
Can study be replicated?	
Data and survey are available	2
Questionnaire is available	13
No, neither data nor survey are available	6
Is sample generalizable?	
Sample of convenience (an existing intervention program)	6
Students identified as at risk	5
Within school	3
Within district or region	5
Nationally representative	1
What is the method of analysis?	
Case study	3
Bivariate	3
Multivariate	13
Multilevel	2
What is the time frame of the study?	
Cross-sectional	13
Longitudinal	8

Most of these studies of coping and resilience focused on older students. No studies examined preschool, and almost all of those focusing on elementary school examined those in older grades, such as 4th or 5th grade. Most focused on experiences within middle and high school or school transitions from

elementary to middle or from middle to high school. As noted above, measures of coping strategies almost always came from students themselves.

Studies can be reproduced when data or instruments are available; with the data, another scholar could revise or build upon the original models, and with the questionnaire, another scholar could repeat the study on different samples. In two studies, both the data and survey are available. Here, researchers employed data from the 1996 National Assessment of Educational Progress (NAEP) (Von Secker, 2004) or the Promotion of Academic Competence Project (Swanson et al., 2003). In most of the studies reviewed here, a questionnaire is available, and the analysis could be replicated in other educational settings. In six cases, information came from interviews (Gayles, 2005; Kenny et al., 2002; Newman et al., 2000), researcher observations (Reis et al., 2005), or researcher-designed questionnaires (Jew et al., 1999; Kanevsky et al., 2008). Results from these studies could not be replicated elsewhere.

The samples from most of these studies do not permit generalization to other populations. Given the focus on at-risk children, researchers identified students who were either involved in a targeted program or whose other academic and personal records indicated risk factors. Eleven of these articles used this type of approach. Six of them used samples of convenience; that is, students who were already enrolled in a specific intervention, including the following groups: Schools of the Future Project (Crean, 2004), a museum-based elementary school program (Kanevsky et al., 2008), a high school–university collaborative program (Kenny et al., 2002), a Young Scholars Program (Newman et al., 2000), a drug prevention program (Plybon et al., 2003), and a hospital-based clinical program for students with learning disabilities (Sorensen et al., 2003). Focusing specifically on at-risk students may permit a more thorough understanding of coping and resilience of such students; however, these studies cannot be generalized to other at-risk populations. In each of these programs, parents or students chose the program, which creates a selection bias. The families who would select such programs almost certainly differ from those who were eligible for these programs and did not apply. Thus, these studies do not permit generalizations even to other groups of students who face the same challenges.

Five studies identified at-risk students by establishing thresholds for at-risk categories and using data to assign students to the sample. Risk characteristics include depressed mothers (Garber & Little, 1999), ethnic minority status and poverty (Gayles, 2005; Reis et al., 2005; Shin et al., 2007; Swanson et al., 2003), and poor literacy skills (Kwok et al., 2007). Because, on average, students from these groups do not perform as well academically as their peers do, they are categorized as being at-risk for performing poorly in school in the future. Some authors established criteria to distinguish highly competent or high-achieving at-risk students from those who are not doing as well (Garber & Little, 1999; Reis et al., 2005). Then, they employed a retrospective approach and asked questions about students' experiences to determine how the successful at-risk students differ from those who continue to struggle in school.

Three studies sampled from a single school, and five sampled from schools within a district or region of the United States. In these cases, authors included information about the ethnic or poverty composition of the students at this school and whether those who refused to participate in the study differed from participants. In these cases, we can draw inferences about how these samples might differ from a statewide or national sample. One study used the NAEP, a national assessment of students in 4th, 8th, and 10th grades. Findings from these studies are more generalizable to other populations.

Turning to causality, we categorize studies by the method of analysis and by their time frame. In terms of methods, case studies (Gayles, 2005; Kenny et al., 2002; Reis et al., 2005) provide detailed descriptions of educational processes through open-ended interviews of selected students. Three of the studies employed bivariate analyses (de Anda et al., 2000; Jew et al., 1999; Newman et al., 2000), and the remaining studies reviewed here employed multivariate or multilevel analysis strategies.

Thirteen of these studies used cross-sectional data in which the coping or resilience measures were gathered at the same time as the academic outcomes. Here, we cannot tell whether, for example, a resilient person gets good grades or whether succeeding in school by getting good grades helps people become more resilient. Eight of the studies were longitudinal; that is, they collected data over multiple time points, and assessed either the influence of coping and resilience on academic outcomes. Some of these studies examined changes in these constructs and outcomes over time (e.g., Chung et al., 1998; Garber & Little, 1999; Sorensen et al., 2003). Others measured coping or resilience prior to the measure of academic performance (e.g. Gayles, 2005; Reis et al., 2005; Kwok et al., 2007).

7.4.2 Study Results

As noted above, studies of coping and resilience focus on different kinds of skills, some behavioral, some attitudinal, and some maladaptive. Some studies highlighted individual attributes, while others addressed social relationships. This section of the report examines the relationships of these skills to academic outcomes, including grades and scores on standardized exams.

Some studies of the influence of positive coping attitudes on academic outcomes had mixed results. Jew et al. (1999) found that attitudes such as confidence and optimism are positively associated with grades, but not math or reading exams. Optimism was negatively associated with feelings of academic stress (Huan et al., 2006). Among 1st-grade students with low literacy skills, those with a resilient personality, indicated by the ability to react to change, performed better on Woodcock-Johnson reading and math assessments (Kwok et al., 2007). Academic confidence was positively associated with grades (Nounopoulos et al., 2006). However, in a study combining attitudes, behavior, and social-coping strategies, Hawley et al. (2007) found that net of these other factors, attitudes did not influence achievement, which was measured by teacher judgment. Similarly, Sorensen et al. (2003) found that improvements in psychosocial adjustment over time were not correlated with improvement in academic performance for learning-disabled students.

Similarly, studies of the influence of positive coping behavior reached different conclusions. Hawley et al. (2007) found that actions such as seeking diversions were associated with positive teacher judgment of academic performance for whites, while seeking spiritual help was associated with positive teacher judgment of academic performance for Latinos. Garber and Little (1999) found that at-risk students with positive coping skills, such as trying to learn from their mistakes, remained competent over time. However, in a study of Latino middle school students, Crean (2004) found a negative association between taking positive actions and grades. Perhaps this relationship is not as strong in early adolescence, or the measure used was not culturally sensitive.

Studies of maladaptive coping strategies found that this behavior was negatively associated with academic outcomes. In particular, concealing problems was negatively associated with school engagement (Marchand & Skinner, 2007), and students who responded to stress with denial decreased their academic competence over time (Garber & Little, 1999).

Some studies of relational coping strategies found evidence for the influence of positive relationships on academic success. Parent support and other adult support are positively associated with grades (Plybon et al., 2003), and having strong maternal attachment is also positively associated with grades (Kenny et al., 2002). Jew et al. (1999) found that believing one could be loved by people outside the family was positively associated with grades and math and reading scores. White and Latino students who responded to stress by investing time with good friends performed better in school (Hawley et al., 2007). However, Nounopoulos et al. (2006) did not find that either family or peer support influenced grades, net of feelings of academic confidence, and Chung et al. (1998) did not find an association between positive social relationships and academic success during the transition to middle school.

Finally, some studies included in this review did not specifically address the influence of coping skills on academic success. Five of these identified resilient students and then tried to determine what distinguished them from less successful students. Of these, three defined resilience as succeeding in school despite demographic risk factors. Resilient at-risk students were African American poor students who were in the top 10% of their high school (Gayles, 2005), female, an ethnic minority, or poor students who scored well on the NAEP science exam (Von Secker, 2004) or participants in an intervention program who did well on a math exam (Kanevsky et al., 2008). In these studies, supportive educational environments and attitudes toward school were associated with resilience. Thus, authors concluded that resilience can be modified, and parents and schools can help at-risk students become more resilient.

Two defined resilience in terms of maintaining positive attitudes toward school despite being ethnic minority students. Shin et al. (2007) found that, for African American and Latino students who maintain positive ethnic identity, having friends who commit delinquent acts does not diminish their school engagement. Swanson et al. (2003) identified African American males with exaggerated stereotypical ideas about males and race as having reactive coping attitudes and find that experiences within school, particularly negative interactions with teachers, can foster these stereotypical ideas.

Two studies examined the frequencies students reported using different types of coping strategies. Newman et al. (2000) found that high-performing students, defined as those making at least a 3.0 GPA, more frequently reported using individual coping behaviors, such as using time wisely, than lower-performing students. De Anda et al. (2000) found that overall, students reported a greater reliance on adaptive coping strategies; however, students experiencing high levels of stress employed a greater variety of maladaptive coping strategies. Girls and whites were more likely to use adaptive coping strategies than were boys and ethnic minorities.

7.5   Discussion

Generally, definitions of coping pertain to the range of skills people use to respond to stress. Definitions of resilience refer to academic success despite risk factors. Most of the studies used a similar

approach of focusing on student reports of their own responses to different kinds of stress. Many of these studies employed surveys using scaled items where students could state their level of agreement with a statement or how often they acted a certain way. However, each study used a unique instrument to measure coping and examined different kinds of coping skills. Authors also classified at-risk students differently. As these studies did not uniformly report a positive association between attitudes, behavior, or relationships on academic outcomes, these discrepancies may result from the different ways that students were classified and these skills were measured. Some studies included only attitudes or actions, while some focused exclusively on relationships without accounting for individual behavior. Future studies should incorporate these different dimensions of coping skills to determine which are the most important.

These varied approaches suggest a lack of theoretical coherence on this topic. Should we expect individual skills to have a greater influence than social-coping skills? Are some coping skills more important in responding to specific stressors? Do some risks pose greater challenges than others? Would we expect resilience to function the same way for all at-risk students regardless of the specific risks they face? These studies do not address these kinds of questions, which would permit setting priorities for research and interventions that can help where they are needed most.

The methods of many of these studies do not permit assessing causality between coping and academic outcomes. With cross-sectional studies we cannot tell whether optimism helps someone perform better in school or whether performing better in school fosters optimism. This is a particular concern with relational skills. Positive social relationships with parents, no-kin adults, and peers indicate resiliency and good coping skills. Other than relationships with immediate family members, social relationships involve a selection process. To some extent, particularly as children become adolescents, they choose how to spend free time, what friends to have, and whether to interact with other adults. Thus, it is not clear whether having positive relationships provides social resources that help the students succeed or whether resilient teens with good coping skills are better able to form positive social relationships. Future research using longitudinal methods should disentangle these relationships.

Studies using participant observation or open-ended interviews are not designed to be replicated with large samples. These studies explore more nuanced approaches to coping and resilience. However, results from these studies can be translated into surveys for large-scale studies.

Many of the studies reviewed here used publically available data and instruments, but some authors did not report the specific items used or their methods for creating the subscales. Without this information, others cannot build directly on this work.

Throughout school, students face many different types of stress. Childhood, and particularly adolescence, involves ongoing physical, cognitive, and emotional changes. Academic work can present challenges, and the behavior of others at school may cause strain. However, some students face particularly difficult challenges, including poverty, family disruptions, and learning disabilities. A question remains whether research should focus on responses most children have to everyday stressors or the responses of students who experience extreme stress. If these constructs are most important for at-risk children, studies of nationally representative samples may hide some of the more detailed relationships for the students who need them most. However, if we only examine coping skills of at-risk students, we

will not know whether more advantaged students succeed because they have these coping/resiliency skills or whether they succeed because of their advantaged status. Future research should examine the kinds of strategies employed by students with different backgrounds and who face different kinds of stress to see, not only if groups of students use different kinds of strategies, but also whether these strategies are equally beneficial to all groups.

Given that coping and resilience research focuses on students who are responding to stress, many of these studies reviewed here limited analyses to at-risk children by using samples of convenience, students who were already participating in given program for at-risk children. Although these studies permit examining the responses of at-risk students in detail, these results may not be generalized to another population of at-risk students or to those facing different kinds of risks. Parents chose to enroll students in these programs, and these samples have a selection bias. Given that interventions should be targeted to those who need them most, studies focusing on at-risk students should be designed so that results can be expanded to other at-risk groups.

Coping and reliance are not fixed attributes; people can learn to improve their strategies for responding to stress. Many of the studies reviewed here suggest that the home and school environment can help foster these skills and, thus, they are susceptible to interventions. Studies of coping and resilience can be used to help develop programs that will help students succeed, but they must be designed in ways that permit assessing the influence of these skills, and the methods used to do so must be transparent.

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Attachment and Sense of Belonging

Author: Patricia Green

8.1 Introduction

Research on attachment and belonging stems from the belief that "no amount of focus on academics, no matter how strong or exclusive, will substantially change the fact that the substrate of classroom life is social and emotional" (Pianta, 1999, p. 170). The social world of school is a major part of students' lives; thus, the quality of their relationships within the school, and their sense of school membership or belonging, can be expected to have a major effect on students' emotional and academic functioning within school. At its most extreme, lack of attachment is associated with alienation from school and withdrawal.

Several policy initiatives of the past decade have been concerned with building a sense of community within schools. The "small schools" movement of breaking large high schools into a series of smaller schools within a school, and the establishment of self-contained 9th-grade schools, is an example of how reform efforts have sought to stimulate the growth of school communities. As one researcher noted, "These reform efforts are, to some extent, ahead of research" (Smerdon, 2002, p. 287).

This chapter will review research that has been conducted in the past 10 years on attachment and belonging within schools. The scope of the review is limited to studies that examined attachment and belonging in relationship to student academic outcomes. The review begins with definitions of these concepts and is followed by a more detailed discussion of the instruments developed to measure them. Strengths and limitations of the measures and the models used in analysis are also discussed.

8.2 Methods

We searched several key terms to identify literature on this topic. Because of the large body of literature available, the word "attachment" was searched in combination with the word "school." Additional searches were performed on "sense of belonging" and "school belonging." After identifying approximately 300 articles, we excluded all articles that focused exclusively on mother-child attachment or that did not examine attachment or belonging within the school setting. Finally, we included articles if they examined the effect of attachment or belonging on school performance; only 16 articles fit this criteria. An additional 20 articles focused on the measurement of attachment and belonging and the relationship between these concepts and engagement or motivation; these are reviewed briefly in Section 8.2.3, which discusses the relationship of attachment and belonging to other noncognitive skills.

8.3   Definitions of Attachment and Belonging

8.3.1   Attachment

"Attachments are powerful emotional relationships within which children seek comfort and safety" (O'Connor & McCartney, 2007a, p. 343). Most of the articles scanned concerned children's attachment to mothers and the relationship between maternal attachment and attachment to teachers. Because maternal attachment is not subject to school intervention, we did not include these articles in our review. However, several articles within the literature on attachment examined school-based relationships. These articles examined the "quality of the teacher-student relationship" and "relationships with classmates" (O'Connor & McCartney, 2007a, 2007b; Pianta & Stuhlman, 2004), "caring relationships" (Dobbs, Doctoroff, Fisher, & Arnold, 2006), the "sense of relatedness" (Furrer & Skinner, 2003), and "connectedness" (Karcher, Davis, & Powell, 2002). The common theme among these concepts is the focus on dyadic relationships rather than a sense of group belonging. This is consistent with attachment theory, which examines the emotional bond between two individuals (Ainsworth, 1989).

8.3.2   Sense of Belonging

Goodenow (1993) defines belonging as "students' sense of being accepted, valued, included, and encouraged by others (teachers and peers) in the academic classroom setting and of feeling oneself to be an important part of the life and activity of the class" (p. 25). By definition, belonging involves the student's subjective appraisal of interpersonal support, rather than observable measures of relationships or classroom climate. Belonging goes beyond individual dyadic relationships to focus on membership within the larger group.

8.3.3   Related Terms

Attachment and belonging are part of a cluster of interrelated terms including school bonding, school engagement, inclusion, school participation, school identification, academic and social integration, student-teacher relationships, and classroom environment. Attachment and belonging are also closely related to engagement. These terms were not used in the database searches that provided the basis for this review; a more comprehensive search using these terms would produce additional studies that are relevant to attachment and belonging.

8.4   Studies of Attachment or Belonging and School Performance, 1997–2008

8.4.1   Methodologies Employed

Table 8-1 presents information on the methodological approaches employed in the studies included in this review. The majority of the studies were cross-sectional studies conducted within a single school district. The quality of the district samples varies across studies, from 2 schools with fairly homogenous student bodies to 11 schools within a major urban area. While none of the articles reviewed used multilevel modeling, several used structural equation models in an attempt to determine the pathway of the effect of attachment/belonging on school performance. Measures of attachment and student-teacher relationships were used across all grade levels; measures of sense of belonging were restricted to studies

conducted in middle schools and high schools. Sample sizes typically numbered in the hundreds, and only a few studies had sample sizes of 1,000 or more.

Table 8-1. Approaches to Studies of Attachment and Belonging

Study Approach	Count of Studies Using This Approach		
	Attachment	Belonging	Total
At what grade level is the construct measured?			
Preschool	1		1
Elementary	2		2
Middle	1	3	4
High	1	6	7
Multiple	3		3
What is the time frame of the study?			
Cross-sectional	4	6	10
Longitudinal	4	3	7
What is the method of analysis?			
Case study			
Bivariate	1		1
Multivariate	7	9	16
Multilevel			
Is sample generalizable?			
Sample of convenience (an existing intervention program)	1		1
Students identified as at risk			
Within school		3	3
Within district or region	4	6	10
Nationally representative	3		3
Can study be replicated?			
Data and survey are available	2	1	4
Questionnaire is available	3	8	11
No, neither data nor survey are available	2		2

8.4.2 Measures of Attachment and Belonging

Overview of the Measures

Table 8-2 presents the measures related to attachment that were used in the studies reported here, and Table 8-3 presents the measures related to sense of belonging. It is important to highlight several differences between the two types of measures.

- Because measures of "sense of belonging" are subjective, they require self-reports on the part of respondents. Because young children are unable to provide reliable self-reports of their feelings, measures of "sense of belonging" are used only with middle school and high school students.

- Measures of attachment are primarily assessments of dyadic relationships and, therefore, do not necessarily rely upon subjective reporting by students. Teachers can provide reliable reports of their relationships with students, and parents can provide insight about students' relationships with other students.

Table 8-2.   Measures of Attachment and Student-Teacher Relationships: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Attachment scale of Devereux Early Childhood Assessment (DECA) LeBuffe and Naglieri	Classroom teachers	Subscales not described; measures behaviors such as actively seeking out social contact, trusting familiar adults, and responding to adult comforting	NA	1	Children ages 2-5	Dobbs et al. (2006)
Relatedness	Student	Relatedness to five social partners: mother, father, teacher, classmates, and friends	20	1	Elementary and middle school students	Furrer & Skinner (2003)
Caring Relationships in School	Student	Adult and peer subscales	6	1	Middle school students	Jennings (2003)
Quality of Teacher-Child Relationship subscale of Student Teacher Relationship Scale (STRS)	Teacher	Conflict and closeness subscales	15	3	Preschool and elementary school	Pianta & Stuhlman (2004) O'Connor & McCartney (2007a, 2007b)
Quality of Classroom Friends	Parent	Subscales not described; items evaluate the quality of a child's friendship with primary playmate	17	2	Preschool and elementary	O'Connor & McCartney (2007a, 2007b)
Teachers as significant others	Student	None	5	1	High school	Domagala-Zysk (2006)
The Hemingway: Measure of Pre-Adolescent Connectedness (Karcher, 2001)	Student	Four subscales: Connectedness to others (parents and friends), to society (future and school)	40	1	Middle school	Karcher et al. (2002)

Table 8-3.   Measures of Sense of Belonging: Key Features

Measure Name	Data Source	Subscales	No. of Items	No. of Studies Using This Measure	Intended Population	Example Articles
Sense of belonging to school	Student	Positive attitude toward school and teachers (8), value based on school (4), peer belonging (4)	16	1	High school students	Gonzales & Padilla (1997)
Psychological Sense of School Membership (PSSM)	Student	Class Belonging and Support Scale (CBSS).[a] Peer support, teacher support, belonging/alienation; PSSM: belonging, acceptance, and rejection	18	4	Middle school and high school students	Gilman & Anderman (2006); Sanchez et al., (2004); Goodenow, (1993); Adelabu (2007)
Relatedness/school belonging (from Patterns of Adaptive Learning Scale-Midgley)	Student	None.	4	1	Middle school and high school	Roeser et al. (1996)
School-belonging subscale (Effective School Battery-Gottfredson)	Student	None.	5	1	Middle school and high school	Benner et al. (2008)
Belonging	Classmates and student	Five: Number of friendship nominations from other students; Time spent in extracurricular activities; Bonding with teacher (6 items) Perceived discrimination based on ethnic group membership (3 items)	11	1	High school students	Faircloth & Hamm (2005)

[a] The CBSS was an early version of the PSSM.

- As children grow, they reliably can be asked to provide assessments about both student-teacher relationships and belonging. Both types of measures are used in research on the middle and upper grades.

- Measures of attachment, because they concern dyadic relationships, become more difficult as children progress through school. It is common in preschool and elementary school for children to have a single teacher. As students enter middle school and high school, children typically have multiple teachers and, consequently, the measurement of multiple teacher-student relationships becomes more complicated.

Measures of Attachment and School Relationships

Data collected from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care was used in three articles. This study used the short form of Pianta's Student Teacher Relationship Scale (STRS). The instrument is composed of 15 Likert-type items that asses a teacher's perception of a relationship with a particular student. A conflict subscale assesses the degree to which a teacher feels that a relationship with a particular student is characterized by negativity, while the closeness scale examines the degree to which the relationship is characterized by warmth, affection, and open communication. This measure was found to predict teachers' ratings of academic achievement, but was not related to students' tested vocabulary in 1st grade. However, in other analyses (O'Connor & McCartney, 2007a, 2007b), the quality of teacher-student relationships was a moderate predictor of student scores on the Woodcock-Johnson Psycho-Educational Battery–Revised (WJR), and high-quality teacher-student relationships were found to buffer children from the negative effects of insecure maternal attachment on achievement.

The other measure of attachment used with preschool children was the Devereux Early Childhood Assessment (DECA). This instrument is designed to be completed by teachers of children ages 2 to 5 and includes three scales: initiative, self-control, and attachment. The attachment scale measures behaviors that are thought to be characteristic of securely attached children, for example actively seeking out social contact, trusting familiar adults, and responding to adult comforting. Attachment was found to be correlated with tested math skills among Head Start children.

The other measures related to attachment were based on middle and high school students' self-reports. "Relatedness" was measured by Furrer and Skinner (2003) using a matrix of 20 items: "When I'm with my (mother/father/teacher/classmates/friends)"—"I feel accepted," "I feel ignored," "I feel like someone special," or "I feel unimportant." This measure was categorized with the measures of attachment because it focused on relationships; however, the inclusion of "classmates" and "friends" means that this scale is much closer to the "sense of belonging" scales than the other measures reviewed in this section. Separate subscales were created for "relatedness to parents," "relatedness to teachers," and "relatedness to peers." Although there was a correlation between relatedness and academic performance, it was found to be mediated by student engagement (as reported by both students and teachers). Relatedness to teachers (and to peers) was found to have unique effects on emotional engagement:

> Children who felt appreciated by teachers were more likely to report that involvement in
> academic activities was interesting and fun and that they felt happy and comfortable in
> the classroom. In contrast, children who felt unimportant or ignored by teachers reported

more boredom, unhappiness, and anger while participating in learning activities. (Furrer & Skinner, 2003, p. 159).

Analysis of the California Healthy Kids database by Jennings (2003) employed a scale measuring caring relationships in school. One subscale measured adult relationships: "At my school, there is a teacher or some other adult who (1) cares about me, (2) notices when I'm not there, (3) listens to me when I have something to say." The other subscale measures peer relations: "I have a friend about my own age who really cares about me, (2) talks with me about my problems, (3) helps me when I'm having a hard time." It is important to note that the peer subscale did not include a reference to school, and it is possible that students considered friends outside of school when answering these items. Ironically, the authors found that there was a significant positive correlation between GPA and caring peer relationships; the correlation between GPA and caring adult relationships in school was not significant.

The measures used in the remaining two studies (Karcher, Davis, & Powell, 2002; Domagala-Zysk, 2006) had significant limitations and are probably not promising candidates for use in future studies. The reliabilities of the subscales used in the former were weak, while the latter study was conducted outside the United States and, consequently, the instrument is not available in English.

Sense of Belonging

The precursor of the most widely used measure of school belonging is based on the Class Belonging and Support instrument developed by Goodenow (1993). The original scale was found to have three factors: peer support, teacher support, and belonging/alienation. The overall scale score was found to be correlated with grades in English classes among 6th- through 8th-grade students, and teacher support was found to be a strong predictor of expectancy of success.

A refinement of this instrument, the Psychological Sense of School Membership (PSSM), was used in three studies. Three subscales capture students' perceptions of peer acceptance, inclusion, and active participation in school life. Sample items include the following: "I feel like a real part of (name of school)," "teachers here are not interested in me," "people at this school are friendly to me," "I am included in lots of activities at this school." Two of the studies found a relationship between grades and belonging (Adelabu, 2007; Gilman & Anderman, 2006), while the other found no direct relationship between GPA and belonging, although belonging did predict absenteeism, expectancies for success in English, intrinsic value of English, and academic effort (Sanchez, Colon, & Esparza, 2004).

The Patterns of Adaptive Learning Survey (PALS) contains a four-item subscale measuring school belonging. Items include the following statements: "I feel like I belong in this school," "I feel like I am successful in this school," "I feel like I matter in this school," "I do not feel like I am important in this school." Roeser, Midgley, and Urdan (1996) used this instrument with a sample of 8th-grade students and found that feelings of academic efficacy and school belonging were positively related to final-semester academic grades. The analysis looked at mediated effects; however, it is debatable whether the sample size of 296 students was sufficient to support the extensive modeling presented. Another study (Benner, Graham, & Mistry, 2008) presented a sophisticated model with a more substantial (1,000-plus) sample of students; however, the four-item subscale of belonging (from the Effective School Battery

developed by Gottfredson [1984]) was used as one measure of school climate, and its unique effect was not discussed.

The remaining three studies used measures of school belonging that were considerably broader than the ones discussed above. Faircloth and Hamm (2005) used four variables to represent their more expansive concept of belonging: friendship nominations, time spent in extracurricular activities, bonding with teacher, and perceived discrimination based on ethnic group membership. They found that the latter three were important for all ethnic groups, and that efficacy beliefs and the value of school predicted belonging, which in turn, predicted academic success in a sample of 5,000 high school students.

Gonzales and Padilla's (1997) measure of belonging included three subscales: positive attitude toward school and teachers (eight items), value placed on school (four items), and peer belonging (four items). They found that "resilient" (high-achieving) students scored higher on each of the subscales than nonresilient (low-achieving) students in a sample of Mexican American high school students.

The final study (Voelkl, 1997) examined identification with school., a concept which is similar to school belonging. The scale used to measure identification comprised nine items assessing belonging and seven items that reflected feelings of valuing school and school-related outcomes. Analysis reported in the article treated the scale as a unitary measure of identification and did not explore the subscales. The study is notable in two respects, however. First, the model showed that classroom participation and academic achievement predicted identification for a group of 1,335 8th-grade students for whom test scores were available in 4th and 7th grades. Second, the newest National Center for Education Statistics longitudinal study includes a measure of school belonging based on this instrument; thus, it will form the basis for future research in this area.

8.4.3 Links between Attachment and Belonging and Other Noncognitive Skills

In the majority of studies reviewed, attachment and belonging were examined along with other measures of noncognitive skills, such as motivation, expectancy of success, value of school, and effort. In addition to the 17 studies discussed in detail, an additional 20 articles were reviewed that focused on either the measurement of attachment and belonging or focused on predicting attachment and belonging using other noncognitive skills. Unfortunately, a clear and convincing model of these interrelationships is still elusive.

Most often, belonging is seen as a precursor of student motivation or engagement, which then predicts student achievement (see, e.g., Hallinan, 2008). Only a few of the articles examined the effect of prior achievement on sense of belonging or teacher-student relationships. Smerdon (2002) and Voelkl (1997) suggested that students' sense of belonging and attachment in school is affected by their past performance in school, and low-achieving students are less likely to have a strong sense of belonging than high-achieving students. Thus, one of the major policy questions might be to consider how to facilitate belonging and attachment to school for students who are struggling academically. Findings from two articles are suggestive.

Hallinan (2008) investigated the impact of teacher support and teacher expectations on students' liking of school and concluded that teacher support influenced student achievement even when

controlling for students' prior achievement. (Teacher support was measured using student responses to three items: teachers really care, teachers try to be fair, and teacher praises hard work.) Teacher expectations were found to have a negligible influence on student achievement.

Using a different model, one that included school goal structures rather than teacher expectations, Roeser and colleagues (1996) found that students who reported more positive teacher-student relationships also expressed more positive affect for school, mediated through feelings of school belonging. The study found a direct relationship between school belonging and end-of-year achievement after controlling for students' prior achievement and all other variables in the model. They concluded that "students who perceived their school as emphasizing understanding, effort, and personal development also perceived that teachers cared about, trusted, and respected students. In contrast, when students perceived that only the most able students were recognized, rewarded and given support, they also perceived that relationships between students and teachers in the school were less warm and responsive" (Roeser et al., 1996).

Together, these studies suggest that there are certain characteristics of teacher-student relationships that promote belonging and academic performance. The key elements of productive relationships seem to be that the teacher cares about and supports students' efforts.

8.5   Discussion

The studies reviewed here consistently demonstrate a significant effect of attachment and sense of belonging on school performance. Insufficient information is available in most articles to estimate an effect size, so the magnitude of the relationship is unknown. Likewise, the directionality of the relationship is unclear: there is evidence that attachment/belonging influences performance and that performance influences attachment/belonging.

Based on the sample of research reviewed for this chapter, it seems that this research area is not cohesive. The articles reviewed were identified by searches on very specific terms (i.e., attachment and belonging). A wider search, using related terms such as school bonding, school engagement, inclusion, school participation, school identification, academic and social integration, student-teacher relationships, and classroom environment, would undoubtedly yield hundreds of additional studies that include variables that incorporate some component of attachment or belonging. There are competing theoretical views of how positive affect for school should be conceptualized and measured.

The reviewer is left with a sense that much of the research is tinkering with definitions and, for lack of a better word, frittering away the opportunity to paint a larger picture of how students develop a sense of belonging or attachment that translates into improved school performance. Everyone seems to agree that belonging makes a difference, but how and under what circumstances it makes a difference needs more emphasis.

Some recent program and policy efforts aimed at fostering belonging have produced mixed results. For example, the Gates Foundation invested in creating new, smaller high schools to promote sustained student-adult relationships and increase the personalization of the educational experience. On

its website the foundation concludes, "Results from evaluations of foundation-funded schools show that new, small schools can improve school climate, grade progression, and student attendance. Improved graduation rates do not always mean greater student achievement or college readiness" (Bill & Melinda Gates Foundation, 2008).

It is tempting to conclude that belonging and attachment may be necessary, but not sufficient, conditions for promoting academic performance. However, while the studies reviewed show an association between the two indicators, it is not 100% clear whether belonging and attachment are always necessary: Are there high-performing schools or school systems in which students report low levels of attachment and belonging? The recent Progress in International Reading Study 2006 included some measures of teacher-student relationships and affect toward school that could be used as a basis to answer this question, analyzing the relationship between these items and achievement across nations.

Further research in the United States might profitably benefit from a major study that examines a variety of noncognitive measures concurrently and also collects information on prior and current academic performance. As stated previously, the majority of the studies reviewed here had sample sizes of fewer than 1,000 students, which makes it difficult to compare types of measures or estimate the types of models that are needed to help clarify the nature and direction of relationships.

8.6   References

8.6.1   Studies Reviewed

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Appendix A: Report Methodology

This report synthesizes information on this set of noncognitive skills and traits and assesses the methods used to study them. We scanned the literature to clarify the definitions of these skills and the various constructs used to measure them, assess the extent to which these constructs are related to one another, report on the strength of the association of these constructs with various educational outcomes at different stages of school, and identify future directions for studying these.

Identifying articles on these noncognitive skills involved conducting a series of searches in Education Resources Information Center (ERIC) and EBSCOhost databases. These search engines provided search results for the following major academic journals that publish education research:

- *American Educational Research Journal*

- *American Journal of Education*

- *Comparative Education Review*

- *Economics of Education Review*

- *Education and Urban Society*

- *Educational and Psychological Measurement*

- *Educational Administration Quarterly*

- *Educational Evaluation and Policy Analysis*

- *Educational Psychologist*

- *Educational Psychology*

- *Educational Research*

- *Educational Research Quarterly*

- *Educational Research Review*

- *Educational Theory*

- *Harvard Educational Review*

- *Journal of Educational and Behavioral Statistics*

- *Journal of Educational Measurement*

- *Journal of Educational Psychology*

- *Journal of Educational Research*

- *Journal of Higher Education*

- *Journal of Negro Education*

- *Journal of Policy Analysis and Management*

- *Review of Educational Research*

- *Review of Research in Education*

- *Sociology of Education*

- *Teachers College Record*

We also searched individually for the following journals that are not available on these search engines: *American Journal of Sociology*, *American Sociological Review*, and *Education Policy Analysis Archives*.

This report includes empirical, original, peer-reviewed research that focused on the effect of these skills on academic success. All searches were limited to publications from 1997 to 2008, with a focus on students in preschool through 12th grade. Studies examining postsecondary outcomes were included only if these skills were used as predictors and were measured before the end of high school. Studies addressing nonacademic outcomes, such as depression or psychological distress, were only included if they considered academic outcomes as well. Almost all of the studies reviewed were conducted in the United States.

To ensure that articles were analyzed consistently, we created a template for coding them along various dimensions, in which some columns were fixed with drop-down responses, and others were variable and permitted more detailed notes. Table A-1 shows the information included in the template for coding articles.

The first set of measures pertain to the way in which study authors defined the skill, whether they used it as a predictor or an outcome, and how they measured it. This information was essential in highlighting differences in the way these constructs were defined and measured.

The next set of measures permits classifying the studies according to the samples used, noting the source of data, characteristics of students, and the sample size. From this information, we can infer whether these studies' conclusions can be generalized to other populations.

Table A-1.   Measures in the Article Coding Template

Measure	Definition	Fixed or Variable
Definitions and relationships to other skills		
Skill	• One of eight defined skills for this research synthesis • Each corresponds to one chapter of this report	Fixed
Definition	• Author's definition of construct	Variable
Construct use	• Predictor • Outcome • Both predictor and outcome	Fixed
How construct is measured	• Either a documented scale or a description of how the author measured the skill	Variable
Source of information for the measure	• Student report • Teacher report • Parent report • Researcher observation	Fixed
Other noncognitive constructs used	• Noncognitive skills, whether or not they are included as chapters in this report	Variable
Sample		
Data source	• The general source of information for this study; this could range from a publically available data set or a series of interviews	Variable
Sample	• Identifying characteristics of sample	Variable
Sample size	• Number of students in the sample	Variable
Grade level when construct is measured (the outcome could be measured in a different school type)	• Preschool • Elementary school • Middle school • High school • Multiple (construct is measured more than once in different grade levels) • Other	Fixed
Research methods		
Ability to reproduce results	• Data and questionnaire are available • Questionnaire is available • Neither data nor questionnaire are available	Fixed
Analytic approach	• Case study • Bivariate analysis (includes cross-tabulations, zero-order correlations) • Multivariate analysis (includes multiple regression) • Multilevel analysis (includes HLM or fixed effects)	Fixed
Study time frame	• Cross-sectional (construct and outcome are measured at the same time) • Longitudinal (construct measured prior to outcomes)	Fixed

Table A-1.   Measures in the Article Coding Template (continued)

Measure	Definition	Fixed or Variable
Outcomes		
Academic outcome	• Grades • Attendance • Math exams • Reading exams • Other exams • Promotion (not retained in grade) • School completion (did not drop out) • Postsecondary attendance • Postsecondary achievement • Other	Fixed
How outcomes are measured	• Could be source of information or scale used	Variable
Relationship to academic outcomes	• Positive • Negative • None	Fixed
Detailed relationship to outcomes	• This measure corresponds to the relationship to outcome measure listed above	Variable

The third set of measures pertains to the quality of each study's approach. We first tracked the extent to which the data and instruments are available. If they are not available, others cannot build upon the findings. For the analytic approach, case studies provide detailed descriptions of educational processes through open-ended interviews of selected students. Bivariate analyses show the relationship between two measures, such as use of a given noncognitive skill and GPA. Multivariate analyses include more than one explanatory measure. From these studies, one can assess the relationship between each noncognitive skill and academic outcomes net of other factors. Multilevel analyses account for the nesting of students within classrooms or schools, and most of the studies reviewed here sampled within a given school or program and/or did not have sufficient sample sizes to use multilevel methods. Although multivariate and multilevel studies do not prove causality, they provide stronger opportunities to assert causality because they account for some alternative explanations of school success.

The timing of collecting study measures also influences assertions of causality. Cross-sectional studies collect all measures at the same time, while longitudinal studies collect measures from multiple time periods. In cross-sectional studies, information about noncognitive skills is gathered at the same time as the academic outcomes. Here, we cannot tell whether, for example, a resilient person gets good grades or whether succeeding in school by getting good grades helps people become more resilient. Longitudinal studies that collected data over multiple time points measured the noncognitive skill prior to the measure of academic performance. These studies provide greater confidence in the assertion that the noncognitive skill contributed to the academic outcome.

The final set of measures present the study outcomes and permitted coding up to three academic outcomes for each study. This information helped us draw conclusions about the relationship of the

noncognitive skills to various academic outcomes. We selected from the set of fixed academic outcomes and then described the way they were measured and their association with the noncognitive skills. Only statistically significant relationships are coded "positive" or "negative."