Noncognitive Skills in the Classroom: New Perspectives on Educational Research

Jeffrey A. Rosen, Elizabeth J. Glennie, Ben W. Dalton, Jean M. Lennon, and Robert N. Bozick

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CHAPTER 1

Introduction

This book provides an overview of recent research on the relationship between noncognitive attributes (such as effort or self-regulated learning) and academic outcomes (such as grades or test scores). Noncognitive attributes are those academically and occupationally relevant skills and traits that are not specifically intellectual or analytical in nature. They include a range of personality and motivational habits and attitudes that facilitate functioning well in school. Noncognitive traits, skills, and characteristics include perseverance, motivation, self-control, and other aspects of conscientiousness (see Borghans et al., 2008). Although they develop throughout childhood, noncognitive attributes developed during adolescence have been shown to have a significant and lasting impact on success in life (e.g., Rauber, 2007). Poor noncognitive attribute and skill development may accumulate over time; poor skills and habits developed and internalized early on may lead to less desirable educational and economic outcomes in adulthood, compounding cognitive or academic problems (Farkas, 2003; Kerckhoff & Glennie, 1999). Noncognitive attributes and skills may play an important role in reversing or limiting delays or deficiencies in cognitive development and academic achievement, and they may complement direct efforts to improve academic learning.

Using a sample of empirical studies covering seven major noncognitive attributes and skills, we provide a general introduction to the field and its challenges, including discussion of major concepts, methodologies, measurement tools, and findings. Because existing publications in this area tend to focus narrowly on specific noncognitive attributes or on particular issues in research (such as theoretical debates or measurement approaches), we hope this work can give both academic researchers and students a better awareness of the noncognitive as a cohesive area of investigation. Our focus is on the state of the research and approaches researchers employ to measure these attributes and skills. We pay special attention to the relationship between these and critical academic outcomes that regularly appear in the educational research literature.

Noncognitive skills research is a relative newcomer to the study of factors affecting student achievement and attainment. Scholarly interest in noncognitive skills dates back several decades (e.g., Bowles & Gintis, 1976; Jencks et al., 1979) and spans multiple disciplines, but most educational research has focused on the relationship between cognitive skills and educational outcomes, demonstrating a significant relationship between the two (e.g., Farkas, 2003; Kerckhoff et al., 2001; Raudenbush & Kasim, 1998).

Noncognitive traits and behaviors, however, might be as important as—or even more important than—cognitive skills in determining academic and employment outcomes (Heckman et al., 2006). For example, Jencks and his colleagues (1979) found that noncognitive skills such as study habits, industriousness, and perseverance show almost identical effect sizes as cognitive skills on occupational attainment. Elements of self-discipline measured through commonly used teacher, parent, and child self-report instruments have outperformed IQ test scores in predicting grades and attainment, in addition to accounting for achievement differences between boys and girls with similar IQ levels (Duckworth & Seligman, 2005, 2006). Similarly, poor behavior in 8th grade is negatively associated with future educational attainment, even after controlling for test scores and background characteristics (Segal, 2008). First-grade teacher ratings of children's temperament and disposition are positively associated with years of schooling at age 22, even after controlling for cognitive test scores (Entwisle et al., 2005). Elements of personality and motivation are associated with higher levels of success on educational, economic, and social dimensions in the Perry Preschool Study, an experimental study of early family environments of disadvantaged children (summarized in Cunha & Heckman, 2007). 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 et al., 2007). Clearly, broad noncognitive traits contribute to success in school (e.g., Chamorro-Premuzic & Furnham, 2003; Duckworth & Seligman, 2005, 2006), and certain noncognitive skills are associated with considerable economic advantages, including earning power (Heckman & Rubinstein, 2001; Mobius & Rosenblat, 2006) and employment and occupational status (Borghans et al., 2008; Waddell, 2006).

Despite the mounting evidence, the relationship between these attributes 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. In addition, some scholars question the explanatory power of noncognitive skills and traits for educational achievement or attainment. Using rich longitudinal data sets, Duncan and colleagues (Claessens et al., 2006; Duncan et al., 2007) find considerable predictive power for school-entry academic skills on attainment but virtually none for the collection of socioemotional skills they examine. Emotional self-regulation and social skills did not make independent, significant contributions to school success.

Given the growing evidence that noncognitive skills can affect academic outcomes, as well as these continuing debates, education researchers, practitioners, and policy makers would benefit from knowing which noncognitive skills matter for various educational outcomes and how to go about defining and measuring those skills. The chapters in this book attempt to address these gaps in the educational research literature by (1) reviewing the definitions of these skills and traits, (2) examining the measurement strategies used, and (3) discussing major findings from recent research and relating these traits to learning outcomes and educational attainment. In 2008, the authors of this manuscript received an award from the Spencer Foundation to conduct a research synthesis about the effect of noncognitive skills and traits on educational attainment in prekindergarten through grade 12. This book builds on the final report we submitted to the Spencer Foundation in November 2008.

About This Book

In this book, we focus on noncognitive attributes that can be measured quantitatively and that have been associated with influencing academic outcomes for students in prekindergarten through grade 12. We include a range of skills pertaining to academic attitudes, work habits, and emotional and social skills. Collaborating with the Spencer Foundation, we identified seven noncognitive skills and traits to investigate:

1. motivation
2. effort
3. self-regulated learning
4. self-efficacy
5. academic self-concept
6. antisocial and prosocial behavior
7. coping and resilience

We chose to review research that focuses on different kinds of attitudes and behaviors. Motivation, effort, and self-regulated learning all pertain to developing problem-solving strategies in ways that are oriented toward academic success. Self-efficacy and academic self-concept studies focus on confidence and belief in one's ability to succeed academically. Antisocial behavior and coping are actions and attitudes that are not directly focused on academic achievement, yet they still may influence academic success.

Methodology

We scanned the academic literature from the past 10 years to clarify the most up-to-date definitions of these seven noncognitive skills, the various constructs used to measure them, and the recently reported findings. Identifying articles on these noncognitive skills involved conducting a series of searches in the Education Resources Information Center and EBSCOhost databases. These databases provided results for dozens of major academic journals, including *American Educational Research Journal, Economics of Education Review, Educational Psychologist, Journal of Educational Measurement, Review of Research in Education, Sociology of Education,* and *Teachers College Record*. We also searched individually for the following journals that are not available in these databases: *American Journal of Sociology, American Sociological Review,* and *Education Policy Analysis Archives*.

We then reviewed empirical, original, peer-reviewed research that focused on the effect of these attributes on academic success in prekindergarten through grade 12. Our objective with this review was not to estimate an overall effect size of each attribute on critical academic outcomes, as a meta-analysis would. Rather, we sought to provide readers with a general sense of the definitions of each attribute, the measurement strategies researchers tend to employ, and how each attribute may be related to educational attainment.

Searches were generally limited to publications from 1997 through 2008, but certain seminal works published before 1997 are included as well. We focused on students in prekindergarten through grade 12. Studies examining postsecondary outcomes were included only if noncognitive skills were used as predictors and measured before the end of high school. Studies addressing nonacademic outcomes, such as depression or psychological distress, were included only if they considered academic outcomes as well. Most of the studies reviewed were conducted in the United States. In each chapter, the reference list includes (1) studies marked with an asterisk, which we reviewed

for inclusion in our research; and (2) studies cited but not included in the research.

We developed a process for collecting information about these articles, including the definition of the skill, its relationship to other skills, the sample, the research method, and the association between the noncognitive skill and academic outcomes. Appendix A presents a more detailed overview of our methodology. This process ensured that the articles were discussed consistently across chapters. That consistency permitted us to identify gaps in the research, limitations in the methodologies used, and robustness of the study conclusions. Specifically, we coded how the skill was defined and measured, the sources of information for the measure (e.g., survey, interview), relationships to other noncognitive skills, information about the sample (size, grade levels), and the study time frame (longitudinal, cross-sectional). We paid particularly close attention to the methodological attributes of each of the studies reviewed so that we could make statements about what was generally lacking (e.g., randomized studies, samples of elementary-school-aged children) in the respective literatures.

Overview of the Chapters

Motivation

Our review of motivation found substantial debate about the components of motivation but general concordance in the effects of motivation on academic achievement. Broadly defined, motivation in educational settings (i.e., achievement motivation) is a desire to accomplish academic activities successfully. Evidence provided in the reviewed articles supported the conclusions that 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 influence and its role vis-à-vis other theories and other noncognitive skills difficult to ascertain.

Effort

Our review identified two key dimensions of effort that influence measurement: 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 (e.g., a science assignment) or to achievement more generally (e.g., trying hard in science class). In the studies reviewed, effort is mostly used as an outcome rather than as a predictor. Three measurement issues that should be considered when developing items to gauge effort or when evaluating empirical evidence that uses existing indicators are choosing between general achievement and task-oriented behaviors, differentiating procedural from substantive behaviors, and the relative utility of subjective and performance-based indicators.

Self-Regulated Learning

Our review found that the precise definition of self-regulated learning varies by theoretical orientation, but broadly speaking, it involves the students' evaluation of a task, their selection and application of problem-solving strategies, and potentially a revision of their strategies based on the outcome. Self-regulated learning has been measured against a wide variety of outcomes, from specific exam grades to end-of-term grades to standardized test scores. It is believed to be affected by global motivation and by self-efficacy beliefs, both of which serve as motivators.

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. 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.

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. 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). Although academic self-concept appears to be positively related to important academic outcomes, such as test scores and grades, both the causal ordering of self-concept and academic achievement and the actual strength of that relationship are not clear.

Antisocial and Prosocial Behavior

Our review of antisocial and prosocial behavior found general agreement on the definition of such behavior, but less agreement on the role that these behaviors play 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 behaviors were not typically examined as direct predictors of academic achievement; researchers either examined them by relating them with academic indicators or sought their associations with other noncognitive skills and social relationships. Nevertheless, the vast majority of research found that antisocial behaviors were negatively related to academic outcomes and prosocial behaviors were positively related to academic outcomes.

Coping and Resilience

Our review of coping found that it refers to a range of strategies that people use to respond to various challenges; it includes attitudes, behavior, and relational skills. Resilience refers to academic success in spite of various risk factors, including demographic, academic, or psychological factors. Most of the studies we reviewed used a similar measurement approach of focusing on student reports of their own responses to different kinds of stress. 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.

Audiences and the Remaining Chapters

This book can benefit a number of audiences. In particular, students of educational research, educational measurement, and educational policy analysis will find value in understanding the merits of different approaches used to study these attributes. Because we used a similar approach to synthesize research on all constructs, this book provides a consistent approach to presenting background information on the definitions of these seven attributes, the approaches used to study them, and the relationship between them and important academic outcomes. Anyone interested in measuring the noncognitive will find value in this research synthesis. This book provides a measurement critique of each attribute, so scholars interested in measurement

can use this information to identify gaps in measurement to build new approaches to analyzing these skills.

In the chapters that follow, readers will find definitions of each attribute, critical assessments of commonly used standard measurement items, syntheses of some of the most recent research on these important attributes, and how these attributes may relate to the most important academic outcomes today. We hope that students and advanced researchers will find the information contained in the following chapters useful as they embark on studies of the noncognitive.

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CHAPTER 2

Motivation

Ben W. Dalton

Introduction

Motivation is a core psychological concept that has a long research history. Besides an extensive literature on general motivation in the psychological research literature, 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 factors such as engagement, effort, and self-efficacy in a complex process that interrelates background factors, immediate social contexts, and individual behavior.

This chapter examines recent studies of achievement motivation from major peer-reviewed educational and social science research publications from 1997 through 2008. Studies of achievement motivation go back 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, we focus on current definitions of motivation; methodologies and measures found in the research literature; recent findings about the relationship between achievement motivation and academic outcomes; variations in this relationship across major groups defined by grade level, sex, or race/ethnicity; and directions for a future research agenda.

Methods

We reviewed 45 empirical journal articles that appeared in major peer-reviewed educational and psychological journals during the identified time frame. We also included five review pieces, which were identified during the review itself, and a handful of additional seminal works to provide background.

We conducted searches by journal (listed in Appendix A) to identify articles containing the key words *motivation* and *achievement.* Within the more than 400 articles returned by these searches, we eliminated those that (1) focused on teachers, administrators, or parents as the subjects; (2) were small-scale studies in developing countries; 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, although used as a descriptor, was typically defined and used as a different concept or idea (such as effort or homework behaviors); (2) motivation was not a key predictor, outcome, or mediator (i.e., it was one predictor among many); and (3) a scientific study approach was not used (e.g., reports of personal discussions with a handful of students). This step yielded a final group of 45 empirical articles. It is worth noting that these studies are reported in US journals; therefore, most of the studies use US samples (although students from Australia, Canada, Germany, Italy, the Netherlands, Singapore, and the United Kingdom are also represented) and may have a US perspective.

Conceptual Definition

The key challenge for understanding achievement motivation and its connection to academic outcomes is distinguishing the several theoretical traditions that diverge on the question of which aspects of motivation to study. These traditions share some common elements, but they place special emphasis on their own conceptualizations of motivation. Some recent works explore avenues of convergence between these differing emphases (Eccles & Wigfield, 2002; Meece et al., 2006) but continue to treat them separately.

Achievement motivation, as noted above, can be described simply as the desire to obtain academic success. In this framework, achievement motivation is a more specific definition of motivation generally, and both are understood as desires to accomplish or do well on a task. This desire is understood as both a cognitive and an affective orientation; that is, it includes both instrumental judgments or beliefs about the personal or social value of a task or goal and emotional attitudes and reactions to the task. This desire to achieve is also recognized to vary according to social situation and individual experiences; it may be prompted or induced by circumstances, or it may be a relatively stable orientation to a domain of activity (Hidi & Harackiewicz, 2000; Weiner, 1990).

Within this broad framework, different traditions focus on particular aspects of achievement motivation and connect motivation to certain other attitudes and perceptions. These traditions include intrinsic/extrinsic theories, expectancy-value theory, and achievement goal theory. Across these theoretical traditions, researchers describe motivation as deriving from two basic sources: interest in or enjoyment of a task or goal itself, and the value of external rewards attached to the task or goal. The first theoretical tradition focuses

on these two elemental factors themselves, identifying them as intrinsic and extrinsic motivation, and serves as a foundation for subsequent theories. The second tradition, expectancy-value theory, describes both intrinsic and extrinsic motivation as task values and incorporates them into a model that includes self-efficacy. The third tradition, achievement goal theory, parallels the intrinsic/extrinsic distinction by investigating mastery and performance goals—more specifically, academic and cognitive conceptions of motivation. Each of these theoretical approaches is described below.

Intrinsic/Extrinsic Theories

Intrinsic/extrinsic theories have been grouped together as interest or intrinsic motivation theories (Eccles, 2004). 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 early distinction in the motivation literature: *intrinsic* versus *extrinsic* motivation (Eccles et al., 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 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, although some extrinsic motivators may 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.* Although some researchers claim that interest is distinct from intrinsic motivation (Schiefele, 1999), "many researchers use the terms interest and intrinsic motivation almost interchangeably" (Hidi & Harackiewicz, 2000, p. 158). Both expectancy-value theory and achievement goal theory, described below, include a definition of intrinsic motivation that equates it with interest (e.g., see Eccles & Wigfield, 2002, p. 120; and measures used by Gehlbach, 2006, and Pintrich, 2000).

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 compelled to act, 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 and highly controlled (Ryan & Deci, 2000; Vansteenkiste et al., 2006). Thus, understanding motivation requires recognizing both the distinction between intrinsic and extrinsic motivation and the more subtle differences in the extent of autonomy experienced in extrinsic motivation.

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 both (1) expectations of success (i.e., self-efficacy) and (2) overall value of the activity or task. Expectancy-value theory defines intrinsic and extrinsic motivating factors (such as interest in a task or external value of the task) as task values that are cognitive beliefs about and affective orientations toward the activity (Schweinle et al., 2006). A student who 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. In this sense, expectancy-value theory incorporates aspects of intrinsic/extrinsic motivation theory.

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

Achievement Goal Theory

The most prominent recent theory of achievement motivation is achievement goal theory. This perspective focuses on the goals that students have for demonstrating competence or achieving mastery. Unlike intrinsic/extrinsic theories and expectancy-value theory, achievement goal theory is explicitly situated in the study of educational achievement (Meece et al., 2006). Proponents argue 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 distinguishes two types of goals and two types of goal attitudes. Achievement goals can be either mastery (or learning) goals or performance goals. *Mastery goals* are those in which students attempt to attain facility with a subject or skill. *Performance goals* are those in which students try to demonstrate competence to a judging individual (whether teacher, peer, parent, or other person) regardless of actual gains in abilities or knowledge; students with performance goals seek relative success and compare themselves regularly and intently to peers. According to this theory, students with mastery goals experience more engagement and greater learning than do students with 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 an avoidance focus attempt to avoid failure 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 concerned primarily with avoiding failure to meet the competence standard. Although 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 involves striving to learn the material at hand; a mastery avoidance goal involves 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 (1) mastery approach goals to (2) mastery avoidance goals, (3) performance approach goals, and (4) performance avoidance goals. Students with mastery and approach goals are predicted to have better outcomes than students with performance or avoidance goals.

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 absorbing 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 et al., 2006; Vansteenkiste et al., 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.

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 2-1 provides a summary overview of many of the article counts reported in the text.

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. Of the articles reviewed here, a substantial proportion (38 studies) used geographically restricted samples, with a little less than half of studies (20) having sample sizes of fewer 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, an overwhelming majority of studies (39 articles) focused on students who were from specific locales, such as an urban or a 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 the study (such as suburban or rural students or students of different races or ethnicities). The only nationally representative samples appeared in three studies using data gathered by the US Department of Education's National Center for Education Statistics (High School and Beyond, National Education Longitudinal Study of 1988, and Program for International Student Assessment 2000) and several original studies whose data are not publicly available.

In more than half of the studies reviewed (26 articles), the research design was cross-sectional. The cross-sectional articles included psychometric studies that investigated items and scales constructed from a new or modified questionnaire or explored relationships between existing scales and additional scales. In most of these studies, investigators used multivariate statistical analysis, ranging from analysis of variance techniques to more sophisticated structural equation modeling and multilevel regression analyses.

Table 2-1. Approaches to studies of motivation

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	0
Elementary school	13
Middle school	9
High school	11
Multiple	12
What is the study design?	
Cross-sectional	26
Longitudinal	19
What is the method of analysis?	
Case study	1
Bivariate	8
Multivariate	35
Multilevel	1
Is the sample generalizable?[a]	
Sample of convenience (an existing intervention program)	2
Students identified as at-risk	2
Within school	11
Within district or region	27
Nationally representative	7
Can the 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).

Definitions of Motivation Used in Studies

Researchers typically defined motivation in one of three ways corresponding to the major theoretical approaches described above. The most common tradition represented in the past 10 years was achievement goal theory, which authors of 22 articles used. Most of these studies 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 studies were about evenly split between global measures of intrinsic and extrinsic motivation and more specific measures of extrinsic motivation levels based on self-determination theory.

Expectancy-value theory was used in eight articles. Some of these studies focused on expectations, some on task value, and some on both aspects of this perspective.

In addition, five studies examined motivation without drawing their definitions from one or more of the three major conceptual approaches. These studies used closely related concepts, such as *general goal orientation* (Powell & Arriola, 2003) or *beliefs about success* (Eaton & Dembo, 1997); some cited major theoretical approaches but, when examined closely, used measures associated with constructs of effort or discipline (Graham et al., 1998; Singh et al., 2002; Wentzel, 1997).

In total, this tally adds to more than 45 articles because 7 articles used multiple perspectives or a global motivation scale related to several definitions. For example, Ginsburg-Block and Fantuzzo (1998), in their experimental evaluation of two types of teaching practices (peer collaboration and problem-solving), used a motivational assessment that combines a measure of learning enjoyment and curiosity with an orientation toward mastery (both teaching practices were associated with increases in motivation compared with students not receiving the practices). Indeed, because of the overlap between theoretical approaches noted earlier, the distinction between studies' conceptualizations is not clear-cut. For example, researchers using 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. Likewise, researchers often measured the concept of mastery goal orientation with items that reflect a similar concept of intrinsic motivation. The next section presents more details about the measurement of concepts.

Measures of Motivation

In terms of specific measurement tools, most of the studies reviewed (40 articles) used student reports of motivation from questionnaires. Researchers typically constructed a motivation variable from multiple items using factor analysis.

These measures are difficult to summarize across studies because of the sheer variety of questionnaires from which they came and the number of changes from original sources that individual researchers made (e.g., changing question wording, adding or deleting items from a previously published survey instrument, or employing different samples, which results in different sets of factors emerging from the data). Most item sets were developed by prior researchers and reported in earlier publications, and many questionnaires have been modified over time so that several forms exist in the literature (including versions propagated by the original questionnaire authors). Finally, although most researchers used surveys identified with a formal name, several questionnaires or scales were not specifically identified, especially in articles examining expectancy-value theory.

Nevertheless, the authors usually reported the origin of most scales and items in their articles and provided some reliability information in terms of alpha coefficients, which were typically around .80 and above. Table 2-2 lists identified measurement instruments used in the reviewed studies and gives some characteristics of these instruments, including reported psychometric properties from cited studies. Note that the reviewed studies represent only a portion of all studies using the instrument or items from the instrument, so reported psychometric data are not necessarily definitive.

Despite the different conceptualizations behind various instruments and varying deployment of instrument items, 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 with the statement "I love learning math." Similarly, both performance goals and extrinsic motivation might be measured by soliciting agreement/disagreement with the statement "I want to get good grades to please my teacher." Likewise, mastery goals and intrinsic motivation use similar items. For example, sample items reported in Lau and Nie (2008) and Regner, Escribe, and Dupeyrat (2007)—two studies using an achievement goal framework—include a statement like "an important reason I do my math work is that I like to learn new things"

Table 2-2.Measures of motivation: Key features

Measure Name	Data Source	Subscales or Components	No. of Items	No. of Studies Using This Measure
School Achievement Motivation Rating Scale	Student	None	15	1
On-Line Motivation Questionnaire	Student	Mood, self-efficacy, success expectancy, task attraction, perceived utility, task anxiety, intended effort	29	1
Patterns of Adaptive Learning Survey	Student; teacher	Mastery approach, mastery avoidance, performance approach, and performance avoidance goals	5–63	7
California Measure of Mental Motivation	Student	Learning orientation, creative problem-solving, mental focus, cognitive integrity	48	1
(Young) Children's Academic Intrinsic Motivation Inventory	Student	Reading/English, math, science, social studies/history, and general school motivation	39	2
Motivation for Reading Questionnaire	Student; teacher	Intrinsic reading motivation, extrinsic reading motivation, reading self-efficacy (with additional subscales)	54	2
Academic Motivation Scale	Student	Intrinsic motivation, extrinsic-identified motivation, extrinsic-introjected motivation, extrinsic-external motivation, general amotivation	20–28	3
Academic Amotivation Inventory	Student	Value of task, ability beliefs, task characteristics, effort beliefs	16	1

Intended Population	Example Articles	Psychometric Properties
Elementary to high school	Chiu (1997)	*15 items* on full scale *Internal reliability (α):* .61 to .90, depending on grade *Test-retest correlation:* .82 to .98, depending on grade (Source: Chiu, 1997)
Middle school	Crombach et al. (2003)	*29 items* on full scale *Internal reliability (α):* .62 to .89, depending on subscale and academic subject *Adjusted goodness-of-fit index:* .80 to .82, depending on academic subject *Test-retest correlation:* .33 to .56, depending on subscale and academic subject (Source: Crombach et al., 2003)
Elementary to high school	Gehlbach (2006); Lau & Nie (2008); Linnenbrink (2005); Pintrich (2000); Regner et al. (2007); Shim et al. (2008); Turner et al. (1998)	*5 items* on mastery goal scale *Internal reliability (α):* .60 6 items on performance goal scale *Internal reliability (α):* .56 (Source: Turner et al., 1998)
Middle to high school	Giancarlo et al. (2004)	*48 items* on full scale *Internal reliability (α):* .53 to .83, depending on sample and subscale *Comparative fit index:* .61 to .73, depending on sample *Adjusted goodness-of-fit index:* .67 to .77, depending on sample (Source: Giancarlo et al., 2004)
Elementary to high school	Ginsburg-Block & Fantuzzo (1998); Gottfried et al. (2001)	*39 items* on full scale *Internal reliability (α):* .83 (Source: Ginsburg-Block & Fantuzzo, 1998)
Elementary to middle school	Guthrie et al. (2006); Unrau & Schlackman (2006)	*54 items* on full scale *Internal reliability (α):* .82 to .86, depending on year (Source: Unrau & Schlackman, 2006)
Elementary school to college	Legault et al. (2006); Ratelle et al. (2007); Zanobini & Usai (2002)	*20 items* on full scale *Internal reliability (α):* .64 to .93, depending on subscale (Source: Ratelle et al., 2007)
Middle to high school	Legault et al. (2006)	*16 items* on full scale *Internal reliability (α):* .74 to .89, depending on sample and subscale (Soruce: Legault et al., 2006)

Table 2-2.Measures of motivation: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Items	No. of Studies Using This Measure
Harter's Intrinsic/ Extrinsic Motivation Scale	Student	Extrinsic and intrinsic motivation	18–30	2
Motivated Strategies for Learning Questionnaire	Student	Interest, learning, learning strategies	2–16	2
Relative Autonomy Index	Student	External self-regulation, introjected self-regulation, identified self-regulation, intrinsic self-regulation	17	1
Learning Behavior Scale	Teacher	Competence motivation, attitude toward learning, strategic/flexible learning, persistent/attentive learning	29	1
Inventory of School Motivation	Student	Mastery approach, mastery avoidance, performance approach, and performance avoidance	43–100	2
Facilitating Conditions Questionnaire	Student	Value, affect, peer positive, peer negative, parent positive, parent negative, teacher	26	1
Experience Sampling Form	Student	Social affect, personal affect, efficacy, challenge/importance	12	1
Science Activity Questionnaire	Student	Science attitudes, goal orientations, and cognitive engagement	39	1
Multi-CAM	Student	Motivational self-regulation (intrinsic, identified, introjected, and extrinsic motivation)	29	1
School Motivation Scale	Student	General interest in classroom activities	10	1
Achievement Goals Questionnaire	Student	Performance approach, performance avoidance, mastery approach, mastery avoidance	12	1
Ulm Motivational Test Battery	Student	Performance approach and avoidance goals, each targeted at parents, teachers, peers, and self	24	1

Note: Elementary school refers to kindergarten through grade 6, middle school refers to grades 7 and 8, and high school refers to grades 9 through 12.

Intended Population	Example Articles	Psychometric Properties
Elementary to middle school	Lepper et al. (2005); Stevens et al. (2004)	*17 items* on intrinsic subscale *Internal reliability (α):* .90 Test-retest correlation: .74 13 items on extrinsic subscale *Internal reliability (α):* .78 Test-retest correlation: .74 (Source: Lepper et al., 2005)
Elementary to middle school	Linnenbrink (2005); Pintrich (2000)	*3 items* on interest subscale *Internal reliability (α):* .89 to .92, depending on administration (Source: Linnenbrink, 2005)
Elementary to middle school	Marchand & Skinner (2007)	*17 items* on full scale *Internal reliability (α):* .78 to .81, depending on administration (Source: Marchand & Skinner, 2007)
Elementary to high school	McDermott et al. (2001)	*29 items* on full scale *Internal reliability (α):* .90 (Source: McDermott et al., 2001)
Middle to high school	McInerney & Ali (2006); McInerney et al. (1997)	*43 items* on full scale *Internal reliability (α):* .66 to .82, depending on subscale (Source: McInerney & Ali, 2006)
Elementary to high school	McInerney et al. (2005)	*26 items* on full scale *Internal reliability (α):* .68 to .82, depending on subscale (Source: McInerney et al., 2005)
Elementary school	Schweinle et al. (2006)	*12 items* on full scale *Internal reliability (α):* Not reported. (Source: Schweinle et al., 2006)
Elementary school	Stefanou & Parkes (2003)	*12 items* on goal orientations subscale *Internal reliability (α):* .36 to .62, depending on administration (Source: Stefanou & Parkes, 2003)
Elementary to middle school	Walls & Little (2005)	*29 items* on full scale *Internal reliability (α):* .81 to .88, depending on subscale (Source: Walls & Little, 2005)
Elementary school	Wentzel (2002)	*10 items* on full scale *Internal reliability (α):* .84 (Source: Wentzel, 2002)
High school	Witkow & Fuligni (2007)	*12 items* on full scale *Internal reliability (α):* .70 to .88, depending on subscale (Source: Witkow & Fuligni, 2007)
Middle to high school	Ziegler et al. (2008)	*24 items* on full scale *Internal reliability (α):* Not reported. *Confirmatory fit index:* .92 to .99, depending on target (Source: Ziegler et al., 2008)

(Lau & Nie, 2008, p. 29), which is similar to items used to measure intrinsic motivation such as "I work really hard because I like to learn new things" (Lepper et al., 2005, p. 196). This finding suggests that instruments could be integrated by identifying overlapping items (for more information, see the Discussion section).

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 et al., 1998). This approach could be used as an individual student measure or as a way of gauging the classroom environment (referred to as *classroom goal structure*).

Other data-gathering methods include teacher reports (especially for measures of classroom environment) via questionnaire (e.g., McDermott et al., 2001) and experience sampling methods, which involve asking students to reflect on their experiences while engaged in (or immediately after) activities (Schweinle et al., 2006). Three studies used researcher observations; these were case studies or experimental studies defining motivation implicitly or in idiosyncratic ways (e.g., prompting students to think about motivation in specific ways during an experiment [Barker et al., 2002] or researcher observation of time on a task [Holmes et al., 2007]).

Substantive Focus and Findings

Most studies used motivation as a predictor of other outcomes (either as a direct predictor or as an intervening variable between the outcome and another predictor). Twenty-eight studies examined the relationship between motivation and achievement or attainment outcomes in this way. The most common achievement or attainment outcomes were overall grade point average (GPA) or standardized test scores (split about evenly). Four studies examined other academic outcomes: teacher reports of achievement (Graham et al., 1998), high school completion (Ratelle et al., 2007), homework time (Trautwein & Lüdtke, 2007), and time spent reading in the classroom (Holmes et al., 2007). Seven studies examined motivation as a predictor of other psychological constructs or behaviors, such as social comparison, problem behavior, or help-seeking. Another seven studies examined motivation as an outcome (e.g., in experimental studies such as those by Guthrie et al., 2006; and Hudley et al., 2007) or as the central focus of a psychometric study examining the measurement properties of one or more motivation scales (e.g., Gottfried et al., 2001).

Consistent with the history of motivation research, authors have consistently observed that motivation significantly influences achievement outcomes or academic behaviors. Of the 28 studies that analyzed the relationship between motivation (however defined) and achievement or attainment outcomes, 22 reported positive associations or influences, five reported no relationship, and one reported a somewhat inconsistent negative relationship (between intrinsic motivation and GPA [Zanobini & Usai, 2002]). The five studies finding no relationship were distributed across the three theoretical approaches at similar rates to the overall distribution (three studies used achievement goal theory conceptualizations and two used measures of intrinsic motivation), providing no indication that there was more or less of an empirical base for one or another of the theoretical approaches. Three of the studies finding no relationship (and the one finding a negative association) measured the outcome as overall GPA, and the other two examined reading outcomes.

Otherwise, motivation was positively related to GPA and to math, reading, or history test scores. 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 overall GPA, whereas mastery avoidance goals were negatively related to GPA. 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 (2007) study is representative of many of the studies that involve examination of multiple relationships in which motivation served as a key. For example, Eccles and colleagues' (2006) longitudinal study of African American 7th and 8th graders in Maryland found that the perceived value of schooling was positively related to overall GPA (conforming to expectations of the expectancy-value perspective) but that this association was modified by perceptions of discrimination: students who perceived discrimination in their lives or the lives of their peers valued school less. Likewise, Lau and Nie (2008) showed that 5th-grade students who had performance goals had lower scores on a math exam than peers who had mastery goals, and this relationship was mediated by engagement and effort. Furthermore, the authors demonstrated that being in classrooms where peers expressed performance goals exacerbated the tendency toward less engagement

and effort among the individual students professing performance goals. Most of the studies that examined motivation as a predictor of academic outcomes explored pathways or relationships such as these.

This was true for studies that examined motivation as a predictor of other psychological constructs or behaviors as well. These seven studies all found that positive aspects of motivation (i.e., intrinsic motivation, mastery orientations, or high task value) were positively associated with academic behaviors such as help-seeking (Marchand & Skinner, 2007) or planfulness (Lau & Lee, 2008) and negatively related to problem behavior (McDermott et al., 2001). For example, Turner and colleagues (1998) examined the emotions associated with failure and how they relate to motivation—defined as having 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, and this relationship was 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 are associated with lower likelihoods that students will engage in helpful learning strategies. This study is limited by being a cross-sectional study and therefore unable to disentangle causal pathways, but its suggestive findings lend support to the argument that mastery goals are preferable to performance goals with respect to their impact on achievement.

The studies that examined motivation itself as an outcome were either psychometric studies or intervention (experimental) studies. One of the more important psychometric studies, by Gottfried and colleagues (2001), 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. They 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. A more recent study by McInerney and Ali (2006) represents a similar effort (with similar positive result) to validate achievement goal measures of motivation cross-culturally.

The remainder of the studies were experimental analyses of interventions designed to increase achievement motivation. Except for one of the seven studies contaminated by methodological problems (Holmes et al., 2007), each of these studies demonstrated effects of their intervention on motivation, suggesting that motivation is responsive to intentional efforts to increase it. Guthrie et al. (2006), for example, found that developing situational interest through hands-on tasks related to reading goals increased intrinsic motivation, which in turn led to increased reading comprehension (see also Morrow & Young, 1997). Alternatively, Stefanou and Parkes (2003) found that test-based assessments had an impact on achievement goal orientations, whereas laboratory-based assessments had no association with goal orientations. Even in studies in which motivation was not the primary focus of the program, motivation was affected: Nichols and Utesch (1998) found that participation in a program addressing behavioral problems (students received prosocial skill training and stress management training and were required to see counselors regularly) was associated with an increase in extrinsic motivation.

Both the experimental and observational research on motivation thus strongly support the idea that motivational variables affect achievement outcomes and that motivation relates to other psychological beliefs and behaviors, such as help-seeking, social comparison, self-efficacy, and performance attributions. All three theoretical orientations show support, and although all share a basic definition of intrinsic and extrinsic motivation, values, or goals, the exact relationships among them and the mechanisms relating motivation to achievement and other constructs are unclear. None of the achievement goal research, for example, explicitly compares its measured constructs to conceptualizations of expectancies and task value found in expectancy-value theory. Such comparisons at an empirical level could be valuable to the field.

Variations Across Time, Socioeconomic Status, Sex, and Race/Ethnicity

Gottfried and colleagues (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 measured reliably 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 these studies.

In only a few cases were students from different populations explicitly compared or were variations in motivational processes by subgroups a major

focus of analysis. Social class and race/ethnicity variations were referenced but typically not carefully studied, making generalizations about variations across such groups difficult to identify. Studies typically included students of one or two racial/ethnic groups or students from specific social class origins, and studies did not usually select their sample to compare motivational processes across groups. In general, the evidence presented supports broad similarities across racial and ethnic backgrounds (Holmes et al., 2007; McInerney et al., 1997; Shim et al., 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).

Sex differences were more commonly studied; most samples were sex balanced. One review by Meece and colleagues (2006), however, summarized research from prior periods (much done in the 1980s) that indicated sex 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 to ability, although 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 sex differences in achievement goals. Recent research identified by Meece et al. (2006) concluded that there were no sex differences in learning and performance goals in mathematics (p. 360), but one of the reviewed studies suggests that there are some achievement goal differences by sex (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).

Links Between Motivation and Other Noncognitive Factors

Achievement motivation is generally thought to be part of a process that includes the following: (1) background factors and situational variables that

influence motivation (Eccles, 2004; Guthrie et al., 2006; Legault et al., 2006), (2) other cognitive and affective influences on motivation (Meece et al., 2006), and (3) variables that intervene between motivation and academic outcomes (Eccles & Wigfield, 2002). In such a complex process, other noncognitive processes 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. Walls and Little (2005) found that intrinsic motivation positively influenced self-efficacy beliefs, which in turn influenced grades and school well-being. This is in contrast to the expectancy-value model described in Eccles and Wigfield (2002), in which self-rated competencies are viewed as influencing motivational components such as interest and utility value, but consistent with the idea that motivational forces operate on achievement through the contribution of other psychological processes and experiences. Similarly, achievement goal theory includes a strong emphasis on the social comparison processes involved in performance goals; for example, Regner and colleagues (2007) found that both performance and mastery goals were related to students' tendencies toward comparing their performance with their peers. Even a desire to learn a subject (not just outperform peers or please adults) involves referring to benchmarks formed by students' social contexts.

Thus, within any given theoretical tradition, factors such as engagement, effort, and persistence—as well as other learning strategies or behaviors—may mediate motivation's influence on academic outcomes (Lau & Nie, 2008; Marchand & Skinner, 2007; Trautwein & Lüdtke, 2007; Turner et al., 1998). For example, Marchand and Skinner (2007) found that autonomous (i.e., intrinsic) motivation was related to help-seeking and coping strategies in a positive feedback loop: "motivationally 'rich' children, by constructively seeking help, become 'richer,' whereas motivationally 'poor' children, by concealing their difficulties, become 'poorer' " (p. 575). Trautwein and Lüdtke (2007) reported that homework effort was partly a function of homework motivation (specifically, expectations for success and value of homework), and Wolters (2004) found associations between mastery orientation and academic persistence and self-regulation strategies (planning and monitoring work).

Discussion

The Impact of Motivation

Although the vast majority of studies reviewed here indicated a positive effect of motivation on achievement outcomes, two aspects of the literature hamper our ability to reach definitive conclusions about the overall importance of motivation as a contributing factor to school success. First, a number of studies had weaknesses in study or analytical design that make it difficult to disentangle causal mechanisms or to have confidence that results are reliable. More than half of the studies (25) were cross-sectional, relying on one-time reports of student motivation, academic practices or outcomes, or other psychological attributes. This is acceptable for psychometric studies whose intent is to explore intra-individual relationships among psychological characteristics, but even these studies are considerably enhanced by using longitudinal data, enabling them to explore both psychometric and substantive issues. In addition, although most studies (36) used multivariate analysis techniques, many observational studies lacked statistical controls for measures that might be involved as distal or proximate influences, including individual measures of social class, race/ethnicity, family structure, or student expectations (as opposed to experimental studies, in which experimental design can account for preexisting differences among subjects). Furthermore, study samples were often relatively small, geographically limited, or concentrated within individual schools, raising questions about the generalizability of findings. This is important in light of the occasional finding that there are differences in motivational processes and effects across populations (Anderson & Keith, 1997; DeBacker & Nelson, 2000; Eaton & Dembo, 1997). Without a more thorough analysis of the methodological and statistical rigor of both this sample of studies and a larger group of studies from ancillary journals or other publications—a task beyond the intent and scope of this chapter—an estimate of the magnitude and limitations of motivation's effects is not available.

The other major reason for a lack of certainty in the literature is the extent to which authors define motivation in different ways. This, of course, is driven by the fact that researchers apply different theoretical models. Even if they share basic concepts such as interest or importance, and even if they use some measures based on similarly worded items, researchers in each of the three theoretical traditions have distinctly different emphases. An expectancy-value theory might focus on expectations for success and spend little time analyzing

task value (inherent interest or instrumental utility); a self-determination approach typically focuses on extrinsic motivation, often with distinctions (e.g., identified, introjected) that other theories ignore; and achievement goal theories ask questions about approach and avoidance that are not central to other perspectives. Although scholars of motivation are engaged in a debate that involves relating and integrating these different approaches (e.g., Eccles & Wigfield, 2002; Hidi & Harackiewicz, 2000), most empirical research is carried out firmly within the orbit of a single perspective and its distinct conceptualizations.

These differences in orientation result in disparate measures of motivation. As described earlier, a plethora of questionnaire-based instruments exists for measuring motivation, including multiple questionnaires for similar concepts. Furthermore, almost every study makes modifications to existing instruments in terms of items included or item wording (if they are not testing a new instrument themselves). This produces a multiplying set of overlapping, study-specific scales that measure different facets of the same motivational constructs, possess different levels of reliability (although typically high), and may exhibit other differences in statistical properties. This diversity compares unfavorably to the kind of measurement standardization that exists for key concepts in other disciplines, such as sociology (e.g., socioeconomic status) and economics. At the least, the literature could be better served by an instrument-reduction effort that integrates questionnaires within theoretical traditions. Standardized variations of the same instrument for certain age ranges, target lengths (i.e., short or long questionnaires), subject (e.g., student or teacher), and other common needs could be developed to enable cross-study comparison of results. A larger effort might involve developing a multiconstruct instrument that compares similar items across instruments representing different theories and explores the possibility of enabling constructs from different theoretical perspectives to be measured by the same set of items. This would be particularly fruitful for the basic concept of intrinsic and extrinsic motivation, which is commonly assessed in both expectancy-value theory and achievement goal theory studies (as well as, of course, intrinsic/extrinsic theory studies). Even if, for theoretical or practical reasons, a multiconstruct instrument is not feasible, cross-instrument comparisons could support theoretical integration by mapping common targets of measurement.

Overall, then, conclusions about the strength of the relationship between motivation and achievement depend on methodological design, conceptual definition, and operational measurement. Drawing conclusions about the strength of motivational effects would be enhanced if there was more uniformity in each of these components.

Conclusion

Despite the diverse theoretical and empirical research approaches identified in reviewed studies, the evidence for motivation's role is remarkably consistent: intrinsically motivated students, students with high expectations of success, and students with mastery goals are all more likely to succeed than students with alternate motivations. 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 theoretical explication of the relationships among motivation control (intrinsic versus extrinsic), expectations, values, and achievement goals. Advances in this field also call for empirical work that can link and consolidate measurement instruments. The primacy of questionnaire-based survey analysis will likely remain unchallenged, although experimental, case study, and other methodologies will continue to play a role in validating and applying the fruits of motivational research.

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CHAPTER 3

Effort

Robert N. Bozick and Terri L. Dempsey

Effort is a widely used concept within educational research that blends a range of student behaviors focused on mastering a skill or completing a task. Despite its widespread use, few analyses clearly articulate, define, or embed effort in a distinctive theoretical framework. Consequently, there is little consensus on the operational definition of effort. Because there is not a well-established theoretical foundation with a corresponding empirical tradition, this chapter evaluates a disparate group of analyses that loosely use effort as a key construct. Given this paucity, we use this review to develop a typology to organize the various conceptions of effort. Unlike other noncognitive skills reviewed in this book, effort is mostly used as an outcome rather than a predictor. As such, this review emphasizes the measurement approaches used rather than predicative efficacy. We first discuss the methods used to select articles, followed by a discussion of the different conceptual dimensions identified in the articles. We then 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.

Methodology

We extracted citations from major peer-reviewed educational and social science research publications from 1997 through 2008 that had *effort* listed as a key word for prekindergarten through grade 12. The basic search process is described in Chapter 1 and detailed in Appendix A. Our initial search yielded approximately 3,000 entries. We then reviewed a sample of these to determine key words for refining the search criteria and identifying the most relevant articles. We settled on *persistence, on-task*, and *engagement*. Next, we identified and reviewed the abstracts of all articles that included these key words to determine their adequacy for inclusion. We eliminated articles that (1) focused on teachers rather than students, (2) lacked effort as a construct of substantive focus, (3) did not provide original empirical analyses, and (4) were practice-oriented publications. In addition, after an initial review of the literature, we

decided to limit the articles to those that operationalized effort as observable behaviors to hold true to the conceptual definition of effort presented in the next section. Because of the small number of relevant studies identified, it became necessary to include eight articles from 1989 to 1995 that fell outside the initially selected date range. The final sample of 32 articles forms the basis of this review. Ten of the studies (31 percent) examined effort as a predictor.

Conceptual Definitions

Effort is often viewed as one component of the broader construct of school engagement (Fredricks et al., 2004). Within the literature on school engagement, effort is considered to be an aspect of both cognitive and behavioral engagement. Cognitive engagement refers to students' psychological investment; it consists of willingness to exert the energy required to understand and master an activity or task. Behavioral engagement draws on the idea of participation; it refers to students' actual execution of an activity or task in school. As a whole, effort is the behavioral manifestation of engagement defined as "students' 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*. We used this criterion in selecting articles for this review (as described earlier) and identifying conceptual dimensions from the literature.[1]

Given the range of behaviors observed across the 32 studies, the definitions used by the researchers reflect different dimensions of effort guided by the aims of their own individual research questions, rather than a particular theoretical perspective. Nevertheless, we identified two conceptual dimensions most frequently described: *degree of effort* and *degree of specificity*. As a means to develop guidelines for assessing measurement properties of this construct, we briefly define and discuss each of these dimensions in turn.

[1] Discerning (or arguing) whether effort is distinct from engagement or a component of engagement is beyond the scope of this chapter. We instead adopt the directive from the engagement literature that effort comprises *observable behaviors*. We only draw on concepts and themes from the engagement literature insofar as they help elucidate our understanding of effort.

Degree of Effort

Degree of effort involves the "overall amount of energy or work expended over the course of learning" (Agbuga & Xiang, 2008, p. 181). The exertion of energy requires that students meet at least the minimum 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). Not all levels of effort put forth by students are the same, and therefore the literature differentiates effort according to degree, or procedural versus substantive effort. In general, procedural effort focuses on the completion of a task, whereas substantive effort focuses on active involvement in the task. Procedural effort consists of completing a learning/academic task, complying with school and classroom rules, and exerting the minimal adequate effort needed to function and to progress through school. Examples of procedural effort include coming to class on time, completing homework assignments, and paying attention during class. Substantive effort reflects moving beyond mere compliance toward taking an active role in learning, such as taking the lead on class projects, spending extra time studying for exams and quizzes, and generally working hard in school.

Some researchers contend that only substantive behaviors can truly be considered effort (e.g., Lee & Anderson, 1993).[2] However, we adopt the procedural-substantive distinction because studies of effort use this distinction when discerning different forms of behavioral engagement to maintain conceptual consistency with this established literature. In addition, we feel there is not enough empirical evidence or theoretical guidance to discount procedural behaviors as indicators of effort. In general, studies measuring compliance/cooperation measured procedural effort, whereas those measuring active participation/working hard measured substantive effort.

To capture the full range of behaviors used to measure effort, we also identify measures of noncompliance. Noncompliance refers to behaviors that disrupt one's ability to exert effort, such as not coming to class on time, not completing homework assignments, or daydreaming during class. These measures indicate a lack of effort and are used as proxies for student disengagement in the studies that we reviewed.

[2] Lee and Anderson (1993) contend 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. 596). We present measures of both procedural and substantive effort for completeness.

Degree of Specificity

The second conceptual dimension of effort identified in the literature is degree of task specificity. We identified two levels of task specificity: task-oriented behaviors and general achievement behaviors. Task-oriented behaviors are particular to an isolated problem or project, whereas general achievement behaviors pertain to effort exerted to do well in school overall or in a particular class overall. Gilmore, Cuskelly, and Purdie (2003) further define task-oriented effort as mastery motivation, or 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-oriented effort to the concept of *flow*—complete concentration, absorption, and focus when performing a specific activity (Ainley et al., 2008; Shernoff & Vandell, 2007). Consider a student taking high school algebra. This particular student gets the highest scores in her class but on one morning she becomes stuck on a difficult algebra problem, and she spends most of the class time reviewing her notes and revisiting the text to figure it out. She is completely consumed in the problem and pays no attention to the side conversations of the students sitting next to her. The next day when she comes to class, it is back to her regular routine of breezing through her algebra coursework because she already learned most of the concepts in pre-algebra. If one were to ask this student how hard she worked on the difficult algebra problem today as opposed to how hard she worked in school today, very different responses may result. This variation in the specificity of the question has direct bearing on how effort is measured, a topic we take up in the next section.

Measurement Approaches

Table 3-1 shows the distribution of the approaches used in the sample of 32 articles.[3] In terms of modal frequencies, the majority of the articles used within-school data that are not available for replication. Most of the studies

[3] Two other instruments were not included in the 32 identified studies on effort but are used frequently enough in the literature on persistence and attention that they warrant mention here: the Learning Behaviors Scale (LBS) (McDermott et al., 1999) and the Preschool Learning Behaviors Scale (PLBS) (McDermott et al., 2000). Both the LBS and PLBS measure four dimensions of children's learning behaviors (competence motivation, attitude toward learning, strategic/flexible learning, and persistent/attentive learning), with nine items measuring persistence/attention (e.g., "Tries but concentration soon fades," "Easily distracted or seeks distraction," and "Doesn't stick to tasks") (McDermott, 1999; McDermott et al., 2002). The LBS and PLBS were not included in this chapter because no studies were identified as using these instruments to measure effort per se, which was the main selection criterion for the articles.

used cross-sectional data on elementary or middle school students and employed multivariate statistics. A summary listing of the key features of the measures used in the sample of 32 studies is presented in Table 3-2.

Table 3-1. Approaches to studies of effort

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	1
Elementary school	10
Middle school	9
High school	4
Multiple	8
What is the study design?	
Cross-sectional	17
Longitudinal	15
What is the method of analysis?	
Case study	2
Bivariate	4
Multivariate	23
Multilevel	3
Is the 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 the study be replicated?	
Data and survey are available	6
Questionnaire is available	12
No, neither data nor survey are available	14

Table 3-2. Measures of effort: Key features

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Persistence/ effort scale	Self-report	NA	1	Middle and high school; 229 public school students in Turkey
Post-task reflection	Self-report	One item for each construct: challenge, skill, absorption, timelessness, and effort	1	High school and college ($n = 45$)
Interest-participation scale	Teacher report	NA	1	Elementary school; 790 students beginning in the 1st grade from the Baltimore City Public School System
Engagement behaviors	Teacher report	Work habits, externalizing behaviors, adaptability	1	Elementary school; 790 students beginning in the 1st grade from the Baltimore City Public School System
Involvement	Self-report	NA	1	Middle school; 297 public school students

Example Articles	Psychometric Properties
Agbuga & Xiang (2008)	*8 items* *Content validity:* Items based on previously developed instrument (Fincham et al., 1989; Xiang & Lee, 2002). *Construct validity:* Exploratory factor analysis yielded a single factor in a pilot study of Turkish students. Established validity and reliability with US students. *Internal consistency reliability (α):* .84 for the pilot study (Source: Agbuga & Xiang, 2008)
Ainley et al. (2008)	*5 items* *Content validity:* Items based on an interactive computer program used in other studies on interest. *Construct validity:* Multivariate analyses conducted by Ainley et al. (2008) found the index of flow based on absorption, timelessness, and effort successfully differentiated between students experiencing flow and nonflow students. (Source: Ainley et al., 2008)
Alexander et al. (1993)	*5 items* *Content validity:* Items based on the Wave I (1976–77) National Survey of Children and selected to be consistent with Kohn and Rosman's research (1972a, 1972b, 1974) as cited in Alexander et al. (1993). *Construct validity:* Exploratory factor analysis supported interest-participation as one factor for full sample and for several subgroups. *Internal consistency reliability (α):* .77 to .82 across years (Source: Alexander et al., 1993)
Alexander et al. (1997)	*9 items* *Internal consistency reliability (α):* .95 for work habits, .83 for externalizing behaviors, and .85 for adaptability behaviors; average correlation of the three components of the scale = .60 (Source: Alexander et al., 1997)
Berndt & Keefe (1995)	*6 items* *Content validity:* Items based on a previously developed scale by Berndt and Miller (1990), as cited in Berndt & Keefe (1995). *Internal consistency reliability (α):* .65 for the involvement scale *Convergent and divergent validity:* Negative correlation between involvement and disruption (–.49, $p < .001$): students with higher grades reported more involvement ($r = .29$, $p < .001$) and less disruption ($r = .–.34$, $p < .001$) and were rated by teachers as more involved ($r = .67$, $p < .001$) and less disruptive ($r = –.46$, $p < .001$). (Source: Berndt & Keefe, 1995)

continued

Table 3-2. Measures of effort: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Teacher Rating Scale of School Adjustment (TRSSA)	Teacher report	Cooperative participation, self-directedness	1	164 kindergartners in the Midwestern United States
Motivational intention questions for effort	Self-report	NA	1	Middle and high school; 289 public school students in the Midwestern United States
Engagement in school	Self-report	Behavioral engagement, emotional engagement	1	High school; 2,672 African American students in Atlanta, Baltimore, DC, and New York; from three independent data sets
Time spent on homework	Self-report	NA	1	High school; nationally representative sample of sophomore students (n = 6,737)
Intellectual Achievement Responsibility Scale (Crandall et al., 1965, as cited in Fincham et al., 1989)	Teacher report	Learned helplessness scale	1	Elementary school; 87 3rd graders in the Midwestern United States; with follow-up at 5th grade
Engagement	Student report; teacher report		2	Middle and high school; nationally representative sample from the NELS:88 data set (n = 18,307 in Finn, 1993; and n = 1,803 minority students from low-income homes in Finn & Rock, 1997)

Example Articles	Psychometric Properties
Birch & Ladd (1997)	*11 items* *Content validity:* Instrument developed in collaboration with participating teachers. *Construct validity:* Factor analysis revealed separate subscales for cooperative participation and self-directedness. *Internal consistency (α):* .92 (cooperative participation), .91 (self-directedness) (Source: Birch & Ladd, 1997)
Chase (2001)	*1 item* *Content validity:* Items based on previous research on intended effort and self-efficacy. (Source: Chase, 2001)
Connell et al. (1994)	*14 items* *Content validity:* Survey items were extracted from several existing instruments. *Construct validity:* Items were selected based on results of internal consistency analyses. (Source: Connell et al., 1994)
DeLuca & Rosenbaum (2001)	*1 item* *Content validity:* Drawn from the US Department of Education's National Education Longitudinal Study of 1988 (NELS:88) data set. (Source: DeLuca & Rosenbaum, 2001)
Fincham et al. (1989)	*10 items* *Internal consistency reliability (α):* .66 (3rd grade) and .54 (5th grade) (Source: Fincham et al., 1989)
Finn (1993); Finn & Rock (1997)	*4 items* *Content validity:* Items were drawn from the US Department of Education's NELS:88 data set. *Construct validity:* Principal component factor analysis was used to create scales. (Source: Finn, 1993)

continued

Table 3-2. Measures of effort: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Student Participation Questionnaire	Teacher report	Minimal adequate effort scale, initiative taking scale, and inattentive behavior scales	2	Elementary school; approximately 2,000 4th graders in Tennessee
Academic effort scale	Teacher report	NA	1	Elementary school students; 437 students in the Northeastern United States
Task persistence	Researcher observation	Task directed scale	1	Preschool and elementary school students; 43 toddlers in Australia
Effort/ persistence scale	Student report	Effort, persistence	1	High school; 544 high school students from the Southwestern United States
School engagement and effort scale	Student report	NA	1	High school; 900 public high school students in the rural Southwestern United States
Rochester Assessment of Intellectual and Social Engagement	Student report	Effort	1	Middle school; 373 students in the Midwestern United States
Engagement vs. disaffection	Teacher report	NA	1	Middle school; an entire cohort of 366 6th graders attending the only public middle school available to a Northeastern US town

Example Articles	Psychometric Properties
Finn et al. (1991); Finn et al. (1995)	*21 items* *Internal consistency reliability (α):* .93 (minimal adequate effort), .89 (initiative taking), and .75 (inattentive behavior) (Source: Finn et al., 1995)
Gest et al. (2008)	*5 items* *Content validity:* Items were drawn from well-validated rating scales. Construct validity: Scales were derived from factor analysis. *Internal consistency reliability (α):* Ranged from .92 to .93 across five separate student assessments. (Source: Gest et al., 2008)
Gilmore et al. (2003)	*4 items* *Content validity:* Persistence in challenging tasks was coded using procedures developed by others. (Source: Gilmore et al., 2003)
Guan et al. (2006)	*8 items* *Content validity:* Items were adapted from other measures. *Construct validity:* Principal component factor analysis resulted in a single factor. *Internal consistency reliability (α):* .90 (Source: Guan et al., 2006)
Hardre et al. (2007)	*6 items* *Content validity:* Items from existing instruments were included. *Internal consistency reliability (α):* .85 *Construct validity:* Confirmatory factor analysis resulted in a single factor for the school engagement scale. (Source: Hardre et al., 2007)
Kiefer & Ryan (2008)	*5 items* *Internal consistency reliability (α):* .77 (Year 1) and.80 (Year 2) *Concurrent validity:* Concordance between student and teacher reports of student effort *Test-retest reliability:* Effort was fairly stable across the transition to middle school from 6th to 7th grade (r = .42). (Source: Kiefer & Ryan, 2008)
Kindermann (2007)	*14 items* *Content validity:* Items were drawn from previously established instrument. *Concurrent validity:* Engagement moderately correlated with grades and achievement scores (ranging from .40 in mathematics achievement to .58 in reading). *Test-retest reliability:* Modified items have reported high stability (r = .73, p < .00, n = 144, over an 8-month period). (Source: Kindermann, 2007)

continued

Table 3-2. Measures of effort: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Effort withdrawal scale	Student report	NA	1	Middle school; 3,943 5th graders
Task engagement	Researcher observation	NA	1	Middle school; 130 total observations of 12 6th grade students from two middle school classrooms in an urban Midwestern US school district
Engagement scale	Student report	One item for each component: effort, attentiveness, lack of boredom in class, and completing class assignments	1	3,669 5th, 8th, and 10th graders attending 24 schools that made "substantial progress in restructuring" (n = 3,699)
Task-specific effort	Student report	NA	1	Middle school; 102 African American and Latino students
Academic effort	Teacher report	NA	1	329 middle school students in the Midwestern United States
Flow scale via experience sampling method	Student report	NA	1	Middle school; 165 8th graders in the Midwestern United States
Student engagement and disaffection	Teacher report	NA	1	200 middle school students in upstate New York

Example Articles	Psychometric Properties
Lau & Nie (2008)	*4 items* *Content validity:* Items based on research investigating student reports of attention, effort, and participation in math classes. *Construct validity:* Confirmatory factor analysis revealed a single factor for effort withdrawal. *Internal consistency reliability (α):* .80 (withdrawal scale) (Source: Lau & Nie, 2008)
Lee & Anderson (1993)	*3 codes* *Content validity:* Codes for qualitative data were based on two conceptual frameworks from existing classroom research (student motivation to learn and conceptual change in science). I*nter-rater reliability:* 81% between two coders (Source: Lee & Anderson, 1993)
Marks (2000)	*4 items* *Internal consistency reliability (α):* .69 *Concurrent validity:* Correlated with classroom observations on student engagement (r = .37). (Source: Marks, 2000)
Roderick & Engel (2001)	*4 codes* No information available
Rudolph et al. (2001)	*1 item* No information available
Shernoff & Vandell (2007)	*3 items* No information available
Skinner & Belmont (1990)	*10 items* *Split-half reliability:* r = .82 (Source: Skinner & Belmont, 1990)

continued

Table 3-2. Measures of effort: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Time on task	Researcher observation	NA	NA	125 elementary school students in Minnesota
Effort and Persistence in Learning (EPL) subscale of the Student Approaches to Learning Survey (Artelt et al., 2003, as cited in Spanjers et al., 2008)	Student report	NA	1	125 elementary school students in Minnesota
Effort and persistence	Teacher report	NA	1	394 junior high students from Britain
School adjustment scale	Teacher report	NA	1	225 elementary school students
Persistence/ effort	Researcher observation	NA	2	Elementary school; 565 kindergarten through 4th grade students from Texas
Persistence/ effort	Researcher observation	NA	2	Elementary school; 113 4th grade students from Texas

Example Articles	Psychometric Properties
Spanjers et al. (2008)	*1 code* *Content validity:* Measurement of time-on-task based on previous work. *Inter-observer reliability:* Inter-observer agreement for time-on-task based on percentage of agreement across two observers for 25% of the students was .93. Agreement for the number of intervals rated as on-task by both observers was .99. (Source: Spanjers et al., 2008)
Spanjers et al. (2008)	*4 items* *Internal consistency reliability (α):* .83 among US students *Construct validity:* Students in the top quartile differentiated from those in the bottom quartile on reading skills (effect size = .36). (Source: Spanjers et al., 2008)
Standage et al. (2006)	*5 items* *Content validity:* Adapted version of the Teacher Rating of Academic Achievement Motivation. *Internal consistency reliability (α):* .92 and .85 for two samples of high school students (Source: Standage et al., 2006)
Valeski & Stipek (2001)	*3 items* *Content validity:* Based on items from the self-directed learner subscale and cooperative participation subscale of the Teacher Rating Scale of School Adjustment. *Construct validity:* Items loaded onto a single factor. (Source: Valeski & Stipek, 2001)
Xiang et al. (2004)	*1 item* No information available
Xiang et al. (2006)	*1 item* No information available

Typology of Measurement Approaches

We created a typology of measurement approaches, shown in Table 3-3, based on the two central dimensions of effort: degree of effort (represented by the columns) and degree of specificity (represented by the rows).[4] Each measurement approach is classified as the by-product of both dimensions. Within each box is listed the number of studies that align with the varying categories. Because of the use of multiple measures within the same study, the sum total of all the cells ($N = 36$) is greater than the total number of studies used in this review ($N = 32$). The focus of the majority of the articles was procedural or substantive effort; however, noncompliance was also used as a measure of degree of effort in a number of studies. In addition, although degree of specificity is divided into two categories—general achievement and task-oriented—most of the measurement approaches used in the 32 studies focused on general achievement rather than task-oriented behaviors. Nonetheless, we discuss each of the measurement approaches across multiple dimensions, except noncompliant task-oriented behavior and procedural task-oriented behavior because none of the 32 articles measured these specific forms of effort. Although the literature on effort is less well developed in terms of age-appropriateness of measures, given that effort is presumably expressed differently across different ages, studies are organized by grade level within each section where appropriate. The conceptual framework (degree of effort and degree of specificity) and the measurement approach used in each study are presented in Table 3-4.

Table 3-3. Measurement typology of effort

	Degree of Effort		
Degree of Specificity	**Noncompliance**	**Procedural**	**Substantive**
General Achievement	$n = 5$	$n = 10$	$n = 12$
Task-Oriented	$n = 0$	$n = 0$	$n = 9$

4 Note that the distribution of measurement approaches in Table 3-1 does not correspond with the frequencies used to identify conceptual definitions. This is because a number of articles used conceptual definitions that did not always accord with their measurement approaches.

Table 3-4. Conceptual framework and measurement approaches

Article	Measurement Approach				
	Procedural	Substantive	Noncompliance	General Achievement	Task-Oriented
Agbuga & Xiang (2008)		•		•	
Ainley et al. (2008)		•			•
Alexander et al. (1993)	•			•	
Alexander et al. (1997)			•	•	
Berndt & Keefe (1995)	•			•	
Birch & Ladd (1997)	•			•	
Chase (2001)	•				•
Connell et al. (1994)	•			•	
DeLuca & Rosenbaum (2001)		•		•	
Fincham et al. (1989)			•	•	
Finn (1993)			•	•	
Finn & Rock (1997)	•	•		•	
Finn et al. (1991)	•			•	
Finn et al. (1995)	•		•	•	
Gest et al. (2008)		•		•	
Gilmore et al. (2003)		•			•
Guan et al. (2006)		•		•	
Hardre et al. (2007)		•		•	
Kiefer & Ryan (2008)		•		•	
Kindermann (2007)		•		•	
Lau & Nie (2008)			•	•	
Lee & Anderson (1993)		•		•	•
Marks (2000)	•	•		•	
Roderick & Engel (2001)		•			•
Rudolph et al. (2001)		•		•	
Shernoff & Vandell (2007)		•			•
Skinner & Belmont (1990)	•			•	
Spanjers et al. (2008)		•			•
Standage et al. (2006)		•		•	
Valeski & Stipek (2001)	•			•	
Xiang et al. (2004)		•			•
Xiang et al. (2006)		•			•

Noncompliant General Achievement-Oriented Behaviors

Five studies used measures of noncompliance as indirect evidence of effort. As mentioned previously, noncompliance refers to behaviors that preclude or prevent one's ability to exert effort, such as not coming to class on time, not completing homework assignments, or daydreaming during class. These studies examined noncompliance with regard to general achievement-oriented behaviors rather than those anchored in a specific task. Each of the five studies employed quantitative analyses of survey data to create scales from multiple items; however, there were some differences in measurement approaches. Three studies focused on elementary school students, and two focused on middle school students. Alexander and colleagues (1997) used school records of 790 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. They found that these behaviors were predictors of dropping out later on in the educational life course. Fincham and colleagues (1989) used items that more directly probed students' lack of effort in a longitudinal study of 87 3rd graders from the Midwestern United States. They measured teachers' reports of whether the student makes a halfhearted attempt when he or she encounters a difficult problem and whether the student says things like "I can't do it" when having trouble with his or her work. Lack of effort was associated with lower math and reading test scores. Finn and colleagues (1995) used a 5-item scale that asked teachers to report on the student's recent (i.e., 2 to 3 months) inattentive behaviors, 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 approximately 2,000 4th graders in Tennessee. Because all three studies were focused on the early years of school, all of them relied on sources other than student self-report (e.g., teacher reports and student records).

The other two studies that used noncompliant behaviors as proxies for effort were based on the middle school years. Compared with other studies measuring noncompliance, 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 students reported lower levels of effort in classrooms that emphasized social comparisons, whereas students in classrooms that emphasized learning and improvement had higher levels of effort. Lastly, Finn (1993) created a series of scales using multiple measures from the

US Department of Education's National Education Longitudinal Study of 1998 (NELS:88), a nationally representative public use data set on middle and high school students. He used questions that asked 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 to form a scale of student preparedness. In addition to student reports, he used teacher reports of whether the student rarely completed homework, was inattentive in class, and was frequently disruptive in class to form a scale of nonengagement. These scales were combined with other scales to form a single 4-point index of participation. Finn found that higher levels of participation were associated with higher student achievement.

Procedural General Achievement-Oriented Behaviors

Ten studies used measures of procedural behaviors oriented toward general achievement as direct indicators of effort. Procedural effort focuses on the completion of an activity or task in school such as a learning/academic task, compliance with school and class rules, and exertion of the minimal adequate effort needed to function and progress through school. Five studies focused exclusively on the elementary school years, and five focused on middle school or on multiple school years. Because of the young age of the students, all of the studies of procedural achievement-oriented behaviors among elementary students relied on reports by teachers or researchers. Birch and Ladd (1997) measured engagement in terms of cooperative participation in a population of kindergarten students from three classrooms in the Midwestern United States. Teachers rated the extent to which students accepted the teacher's authority and complied with classroom rules and responsibilities. Higher cooperative participation was associated with better relationships with teachers. 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 participate in class. Alexander and colleagues (1993) created a scale of student interest and participation among 1st graders based on teacher reports of the student's enthusiasm and expression of ideas. They found that student interest and participation was negatively associated with standardized test scores later on in the 4th grade. Lastly, two studies authored by Finn and colleagues (Finn et al., 1991; Finn et al., 1995) used data on 4th graders from

the Tennessee Student/Teacher Achievement Ratio (STAR) project. Both studies relied on teacher reports of how often the student paid attention in class and how often the student turned in homework assignments on time to measure minimal adequate participation in school. Finn et al. (1991) created and validated the scale, and Finn et al. (1995) found these behaviors were associated with lower standardized test scores.

The remaining five studies that measured procedural, achievement-oriented behaviors as indicators of effort focused on the middle school years or multiple years of school. All but one of the studies used scales based on student self-reported measures of classroom behaviors. Measures of effort included paying attention (Connell et al., 1994; Finn & Rock, 1997; Marks, 2000), completing homework assignments on time (Connell et al., 1994; Finn & Rock, 1997; Marks, 2000), and participating in class discussion (Berndt & Keefe, 1995). Effort was typically used as an outcome, whereby students with a range of favorable academic characteristics exerted the most effort in class, such as previous academic success (Marks, 2000), resiliency (Finn & Rock, 1997), and relationships with positive peers (Berndt & Keefe, 1995). Connell et al. (1994) found that the interpersonal context of the school (i.e., perceived relatedness to others) predicted engagement in school, which in turn predicted school performance and adjustment.

Skinner and Belmont (1990) used teacher reports of student behaviors to measure effort in class. They asked teachers of students in grades 3 through 6 to report on the frequency of student behaviors such as participation in class (e.g., "When in class, this student acts like he/she is working?" and "When in class, this student participates in class discussions?"). They found that students who held high strategy beliefs (e.g., "To do well in school, I need to do *x*, *y*, and *z*") and high-capacity beliefs (e.g., "I have the capacity to do *x*, *y*, and *z*") exerted the greatest amount of effort in class.

Substantive General Achievement-Oriented Behaviors

The most common type of measurement approach in our review was one that gathered information on behaviors that reflected an active, self-directed investment on the part of the student to do well in school, or substantive effort exerted toward general achievement. Twelve of the studies met this criterion. The vast majority of studies examined middle and high school students. One study examined the upper elementary grades (Gest et al., 2008), and one study examined kindergarten students (Birch & Ladd, 1997). All but three of the studies used questions that attempted to quantify how hard the student worked

in class. Scales were based on items that asked students to subjectively rate how hard they worked. For example, "I work really hard in this class" (Hardre et al., 2007); "In social studies/ mathematics class, how often do you try as hard as you can?" (Marks, 2000); and "I try very hard in school" (Kiefer & Ryan, 2008). Scales were also based on items that asked teachers to subjectively rate their students' work: "Compared with the typical student, how hard is he/she working?" (Rudolph et al., 2001); "The child 'works independently' and/or 'seeks challenges'" (Birch & Ladd, 1997); or the student "does the best s/he can" (Gest et al., 2008; Kindermann, 2007). Similar to other studies discussed previously, effort was typically used as an outcome, whereby students were most likely to exert effort in class if they had a positive perception of their classroom and their own ability (Hardre et al., 2007), had a better relationship with teachers (Birch & Ladd, 1997; Kindermann, 2007; Marks, 2000), had positive social goals in school (Kiefer & Ryan, 2008), made grade transitions with their peer groups (Rudolph et al., 2001), and were involved with a peer group with a positive academic reputation (Gest et al., 2008; Kindermann, 2007).

Of the 12 studies focused on substantive general achievement-oriented behaviors, three stand out for their method of quantifying the exertion of effort—by inquiring about student performance when facing challenges. Standage, Duda, and Ntoumanis' (2006) study of junior high school students in Britain asked teachers to rate student 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 and colleagues (2006) asked middle school students in Turkey and in the United States (Texas) to rate their 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 or the challenge of class/activities, the researchers kept the question oriented toward general achievement but provided an additional cognitive cue to help the respondents think more carefully about their ability to perform the behavior they were asked to evaluate. Although these three studies were based on performance in physical education classes, the studies used measures of effort that could help guide the construction of measures more suited to academic courses. All three studies used effort as an outcome and found that motivation (Standage et al., 2006), performance goals (Agbuga & Xiang,

2008), and performance expectations (Guan et al., 2006) were all significant predictors of effort.

Two other studies did not subjectively inquire about hard work but 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) contend that "time spent on homework is a report of actual behavior, … which may contribute to academic skills. … that [type of] effort may indicate a capacity for perseverance that will be useful [later in life] when college presents difficulties" (p. 360). Both studies used data from NELS:88 to show that time spent on homework was a positive predictor of college enrollment (DeLuca & Rosenbaum, 2001) and of standardized test performance (Finn, 1993). Although more specific in terms of quantity (i.e., time), this measure lacks an indication of the degree of challenge, because not all homework assignments are equally demanding; and in some cases, a greater amount of time spent on homework can indicate learning difficulties rather than effort.

Substantive Task-Oriented Behaviors

The last type of measurement approach we reviewed gauged behaviors reflecting the initiation of activities and the expansion of thinking beyond the necessary requirements to complete a specific problem or a task, or substantive task-oriented behaviors. Nine studies used measures that met these criteria. Four studies examined elementary school students, and five studies examined middle and high school students. Here we discuss the measures according to data source rather than grade level.

Four of the studies used items similar to those measuring substantive achievement-oriented behaviors (described in the previous section); however, to measure task-oriented behaviors, students were asked to subjectively rate the degree of hard work exerted in performing the task at hand (Ainley et al., 2008; Chase, 2001; Roderick & Engel, 2001; Shernoff & Vandell, 2007). Ainley et al. (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 middle school students to identify the activities they were currently doing and to note how hard they were concentrating on those activities. Chase (2001) examined effort intentions by asking students to imagine having difficulty performing a task (i.e., physical education or sport skill) that they would otherwise normally

complete successfully and then to indicate how hard they anticipated working the next time they practiced their skill or sport, using an 11-point response scale where zero indicated *not much effort at all*, 5 indicated *some effort*, and 10 indicated *a lot of effort*. In addition, Roderick and Engel (2001) asked middle school students to describe whether they worked hard to prepare for newly instituted high-stakes testing. In each of these studies, students were given a specific reference point on which to frame their responses. Ainley et al. used their measure of effort to identify students who were exhibiting flow (i.e., high on task absorption and low on effort). Shernoff and Vandell detected a positive relationship between participation in a sports/arts enrichment program and effort. Chase (2001) predicted that students who felt more capable of successfully performing the task at the outset would report higher levels of intended effort in the face of difficulty. The results were not significant, but they were in the predicted direction. Roderick and Engel (2001) found that students exerted greater academic effort when testing was required.

Two of the nine studies used performance-based indicators of effort rather than subjective self-evaluations. Both were authored by Xiang and her colleagues (2004; 2006), and both evaluated a physical education program in a Southwestern US state, where elementary school students 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 throughout 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 et al., 2004, p. 222). Students who expressed mastery goals expected to do well and were most likely to exert effort on this task. Similar to the measure of time spent on homework discussed in the previous section, despite asking students to run/walk "as many laps as possible," this performance-based measure lacks an indication of the degree of challenge across students, because not all youth have the same ability to run long distances. That is, 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. Thus, it is unclear how the level of difficulty, or students' ability to perform the behavior, fits into Xiang and colleagues' (2004; 2006) measurement of effort.

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 exhibited task-directed or non–task-

directed behaviors while completing a task. Gilmore and colleagues (Gilmore et al., 2003) had 43 two-year-olds and eight-year-olds in Australia each complete two structured mastery tasks: jigsaw-type puzzles for the former group of students and concentration-style games for the latter. Researchers observed these mastery activities, each lasting 4 minutes, and classified the youth's performance at every 15-second interval as either task-directed or non–task-directed. They found task-directed behavior was not correlated with the child's cognitive ability to complete the task. Owing to small sample sizes, however, it is unclear if this nonsignificant relationship would hold true in the larger population.

Spanjers and colleagues (2008) recruited a sample of 125 students in grades 3 and 4 in a Midwestern US state to complete a reading comprehension exercise. While the students read, researchers observed and coded their time-on-task behavior by looking for multiple indicators of both on-task behavior (such as looking at the reading material, writing, or raising a hand for assistance) and off-task behavior (e.g., talking about anything other than the assignment, gazing away from the reading passages, reading something other than the assigned passages, or leaving their seat for nonrelevant reasons). A primary interest of Spanjers et al. was to determine whether these observable behaviors actually represented student effort. Thus, in addition to conducting behavioral observations, they also directly asked students to assess how hard they worked on the reading assignment after it was completed (e.g., "I worked as hard as possible" and "I kept working even when it was hard"). Interestingly, the correlations between the researchers' observations and the student reports were nonsignificant in grade 3 and were significant, however small, in grade 4. Similarly, the association between time-on-task and reading comprehension was significant only for 4th graders. This suggests that the population source of the measure may affect its measurement properties; however, it is hard to ascertain with confidence given the size of these samples and the magnitude of the effect.

Lastly, Lee and Anderson (1993) conducted classroom observations and interviews of 12 6th grade students using a semistructured interview to probe into students' cognitive and metacognitive processes while they were actually engaged in classroom tasks during a science lesson on matter and molecules. The researchers recorded students' behavioral responses throughout the lesson to parse out procedural behaviors from substantive ones. Specifically, they were able to identify what they termed *self-initiated cognitive engagement*

among students, or 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 most likely to be engaged in the lesson as exhibited by procedural and substantive behaviors.

Discussion

As evidenced in the small number of articles that were deemed adequate for this review (32 articles out of an initial pool of approximately 3,000), the measurement of effort does not have a well-established base on which to draw. However, in highlighting the key dimensions of the concept and 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 uses existing indicators: choosing between general achievement and task-oriented behaviors, disentangling procedural from substantive behaviors, and the relative utility of subjective and performance-based indicators. We briefly discuss each of these in turn.

Although not evident in any one particular article, the distinction between general achievement and task-oriented behaviors could have major implications for the conclusions drawn from any particular study. Because the school day is divided into segments of activities that vary in content (e.g., art class or math class) and in teaching approach (e.g., lecture or group activities), any measure of effort 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 may compel large-scale studies to focus on the general rather than the specific task; however, this needs to be acknowledged when drawing conclusions from analyses that use general achievement-oriented measures. Conversely, effort on specific tasks (e.g., working hard on a science *problem*) should not be interpreted as more general effort (e.g., working hard in science *courses*). Compounding this issue is that effort is not believed to be a stable trait, but rather one that changes over time in response to different tasks and contexts (Fredricks et al., 2004).

The next consideration is the use of procedural and substantive indicators of effort. As alluded to earlier, there is no consensus as to 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 combined to form a single scale of effort, rather than individual scales for each unique measure. Although this might be analytically convenient, it masks the theoretical and analytical distinctions between these two constructs, thus hiding the multifaceted ways students engage in school, and in some cases could lead to misleading results. We therefore recommend using items that measure these concepts as two distinct aspects of effort. A useful example of this is Finn et al.'s (1995) analysis of 4th-grade achievement. They created separate scales for minimally adequate effort (i.e., procedural) and for initiative taking (i.e., substantive). 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 engagement.

Lastly, although few studies examined multiple types of indicators within the same study, this review as a whole examined multiple indicators of student effort. We noticed that a large number of studies used self-report of effort with items such as "I work really hard in this class." The built-in subjectivity of self-report measures makes comparisons less convincing than when performance-based indicators are used because a quantifiable interpretation is not possible with self-report. 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 (Spanjers et al., 2008). Although 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 in the same study would strengthen the current work on effort, allowing researchers to assess the reliability and validity of these measures and providing information on which measure(s) are best suited to the research topic at hand.

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CHAPTER 4

Self-Regulated Learning

Jean M. Lennon

Introduction

To understand differences in levels of performance between students that cannot always be explained by inherent ability, researchers have considered a variety of social-behavioral factors. One such factor is the use of self-regulation in learning, by which students evaluate tasks; review the strategies available to them for accomplishing the tasks; apply themselves to completing the tasks; monitor the effectiveness of their strategies; and, depending on outcomes, revise their model for approaching similar tasks in the future. The concept of self-regulated learning (SRL) developed in the 1980s and began receiving widespread attention in the 1990s (Dinsmore et al., 2008). Theoretical accounts of SRL are varied and include perspectives from social cognitive theory (e.g., Schunk & Zimmerman, 1997), information processing (e.g., Winne & Hadwin, 1998), and others (e.g., Boekaerts, 1999). Across theoretical perspectives, there is a clear cognitive component of SRL; however, inclusion of the concept in this volume on noncognitive factors reflects the strong role played by other noncognitive, or at least nonintellectual, processes many have included as part of self-regulation.

In the following sections, we review models of academic self-regulation and briefly discuss how SRL is related to other skills. We then review different measurement approaches in the field of self-regulation research and findings from the empirical studies reviewed. In the remainder of this chapter, the terms *academic self-regulation, self-regulation,* and *SRL* are used interchangeably to refer to self-regulation as it pertains to learning activities.

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 15 articles for this review.

Conceptual Definition

Definitions of Self-Regulated Learning

A tremendous amount of interest in self-regulation exists, but the boundaries of the concept remain fuzzy. SRL 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 discussed below. 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," whereas younger children's behavioral self-regulation may be characterized by "approach/withdrawal, distractibility, and persistence" (Howse, Calkins, et al., 2003, p. 102).

According to one oft-cited source, 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). In contrast to some other concepts reviewed in this volume, SRL's definition and the conceptual boundaries of the term vary considerably among researchers. This may be due, in part, to the fact that SRL had its impetus in the classroom rather than the halls of academe. That is, most accounts of SRL have been constructed from available theoretical elements (e.g., metacognition and self-regulation) to explain and direct academic learning (Boekaerts, 1999; Dinsmore et al., 2008).

Zimmerman (2001), among others (e.g., Boekaerts, 1999; Pintrich, 2000), provided an overview of features common to most definitions of SRL. The

first is that students are aware of their self-regulatory processes and how these can be used to improve their academic achievements. The second is that a self-oriented feedback loop is present 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 SRL 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.

Selected Models of Self-Regulated Learning

A review of three models of SRL illustrates the convergent and divergent elements that can be found in research on SRL and the various theoretical perspectives represented (for a more comprehensive review of theories, see Pintrich, 2000; Puustinen & Pulkkinen, 2001). Many accounts of SRL posit a succession of stages or phases that comprise SRL. For example, Zimmerman's (2002) 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. Task analysis involves goal setting and strategic planning specific to the task the student faces. Self-motivation beliefs include self-efficacy, outcome expectations, the task's intrinsic value for the student, and the student's learning goal orientation. For example, students who enjoy the subject of science will be more motivated to learn in a self-regulatory manner.

Performance is the second phase, which is characterized by two types of processes: self-control and self-observation. Self-control refers to employing the task-specific strategies the student identified during the first phase of forethought. Self-observation refers to self-monitoring or tracking aspects of performance, such as time spent studying a certain subject or number of errors noticed in a spelling exercise. Self-observation can be done as part of a self-regulatory exercise wherein the student records aspects of his performance, or it can be done internally by the student.

The third phase of Zimmerman's (2002) cyclical model is the self-reflection phase. This takes place after the SRL event, wherein self-judgment (comparing one's performance to others' or a standard, deciding on causal attributions for performance) and self-reaction (self-satisfaction and positive affect about performance) may or may not lead to changes in the variables that make up the

forethought phase for subsequent SRL events. Zimmerman's model includes self-monitoring during task performance and a potential phase of self-review.

Winne and Hadwin (1998) also propose a multiphase model of SRL, but they draw on information-processing theories to provide a more fine-grained analysis of what occurs within each phase, as well as the interactions among the phases. The four phases are task definition, goal setting and planning, studying tactics, and adaptations. The finer-grained analysis at each of the four phases is accomplished using a framework known as COPES, standing for an individual's *c*onditions, *o*perations, *p*roducts, *e*valuations, and *s*tandards. *Conditions* refer to the resources available to the person internally (e.g., cognitive conditions, such as beliefs, domain knowledge) and externally (e.g., task conditions, such as instructions, time available) at a specific phase of SRL. *Operations* are the cognitive processes that take place during learning and that generate specific products at each phase. *Products* are the information or content generated by specific operations. *Standards* refer to the criteria that define success for any given phase. (Note that for phase 1—task definition—the overall set of standards comprises the student's goals at the beginning of the learning.) *Evaluations* refer to the student's cognitive monitoring of the discrepancy between standards and products within a given phase to determine if more work is needed to meet relevant standards. (If more work is needed, the student might initiate greater control over the learning or revise the standards and/or conditions.) According to Winne and Hadwin (1998), most of the time spent learning involves phases 1 through 3, with phase 4 (adaptation) reserved for a more major restructuring of the beliefs, motivation, and strategies related to SRL. (See Greene and Azevedo, 2007, for a thorough review of Winne and Hadwin's model.)

Integrating SRL research on learning styles, metacognition and regulation styles, and theories of the self, Boekaerts (1999) proposes a three-layer model of SRL. The innermost layer is concerned with research on students' learning style, or "the characteristic modes of organizing and controlling cognitive processes" (p. 447), for example, holistic and serialistic (Pask, 1988) and deep-level, surface level, and concrete processing (Vermunt, 1992). The middle layer of Boekaerts' model covers research related to whether students perceive a choice in which of these modes they use in SRL. Researchers in this area describe successful learners as those who are able to select the most appropriate strategy for a specific situation. Finally, the outer layer of this

three-layer model pertains to the reasons students choose to marshal their self-regulatory resources toward achieving an academic goal.

Relation of Self-Regulation and Other Noncognitive Skills

As previously noted, 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 it is an integral component of self-regulation, both empirically and theoretically. As McCoach (2000) notes," 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" (p. 7). In the context of this volume (see Chapter 2), motivation is regarded as the desire to achieve success, in this case, in academic pursuits. Varying theories of motivation describe it as following from an interest in the task or goal and/or from the desire to obtain external rewards attached to the task or goal. As such, motivation can be seen as a necessary ingredient for self-regulation to occur.

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). In other words, self-efficacy is a belief that can both reflect and help drive SRL. A more detailed discussion of self-efficacy can be found in Chapter 5 of this volume.

Measures of Self-Regulation

The components of SRL measured in recent studies vary significantly. In their investigations of SRL, the studies reviewed here included measures of motivation, learning strategies, self-concept, metacognition, learning behaviors, learning-related skills, and false belief. This variety of constructs suggests that there exists some debate as to the components of SRL. This is consistent with findings reported by Dinsmore and colleagues (2008), who examined theoretical definitions and measurement strategies in 255 studies on metacognition, self-regulation, and/or SRL. They found variability

across studies in both the definition and measurement of SRL, although the congruence between the definition and the measure within a study was greatest for SRL compared to metacognition and self-regulation.

As with many of the 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 used in the field. Table 4-1 lists SRL measures and some of their key features, including psychometric information when available in the articles reviewed.

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 a 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 4-1). Eleven self-report measures were identified, and only one 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 multiple types of SRL exist, 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 and 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 a structured interview 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.

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, parent and teacher ratings, and observations.

Think-Aloud Measures. Think-aloud measures vary in how structured they are, but they all 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 errors are 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 4-1. Measures of motivation: Key features

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
Peg-tapping measure of inhibitory control, item selection measure of attention shifting, unexpected contents and changed locations tasks	Observation		1
Children's Behavior Questionnaire	Teacher/parent report	Anger, approach, attention, and inhibitory control	1
Strategic Flexibility Questionnaire (SFQ)	Self-report	Adaptiveness, inflexibility, and irresoluteness in self-regulatory control	1
Survey of Learning Behaviors (SLB)	Self-report	Self-regulation: self-monitoring subscale; Self-regulation: knowledge acquisition subscale, self-efficacy scale	1
Self-Regulation Strategy Inventory—Self-Report (SRSI-SR)	Self-report		1
Self-Regulatory Skills Measurement Questionnaire (SRSMQ)	Self-report		1
Self-Regulation Test for Children (SRTC)	Self-report	NA	1
Instrumental Competence Scale for Children (COMPSCALE)	Teacher report	Motivation, behavior	2
The Emotion Regulation Checklist	Parent report	Negativity/liability scale, emotion regulation scale	1

	Intended Population	Psychometric Properties
	3- to 5-year-olds	Not reported.
	3- to 5-year-olds	*16 items* *Internal consistency reliability (α):* .74 to .91 (teacher ratings); .51 to .71 (parent ratings) (Source: Blair & Razza, 2007)
	10th graders	*21 items* *Internal consistency reliability (α):* .80 (Source: Cantwell, 1998)
	15- to 22-year olds	*29 items (13 ,9, 7 per scale)* *Internal consistency (α):* .61 to .89 depending on subscale (Source: Chularut & DeBacker, 2004)
	9th and 10th graders	*45 items* *Internal consistency reliability (α):* .92 (composite); .72 to .88 (subscales) *Construct validity for composite score:* All three scales from the SRSI-SR loaded onto one higher-order factor, with factor loadings ranging from .83 to .71. *Discriminant validity:* The SRSI-SR scales loaded on a separate high-order factor than other measures (i.e., the Task Interest Inventory and Perceived Instrumentality Inventory). (Source: Cleary, 2006)
	6th and 7th graders	*33 items* *Internal consistency reliability (α):* .86 (Source: Eom & Reiser, 2000)
	5- to 8-year-olds	*1 item* *Test-retest reliability: r* = .92 *Convergent validity: r* = .35 to .40 (Source: Howse, Lange, et al., 2003)
	5- to 8-year-olds	*18 items* *Test-retest reliability: r* =.86 *Predictive validity: r* = .61 (Source: Howse, Calkins, et al., 2003)
	Preschool and kindergarten students	*Internal consistency reliability (α):* .77 (negativity/liability scale), .68 (emotion regulation scale) *Convergent validity: r* = .50 (Source: Howse, Calkins, et al., 2003)

Table 4-1. Measures of motivation: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
Laboratory Assessment of Temperament–Preschool Edition	Observation	Frustration	1
Control, Agency, and Means–Ends Interview (CAMI)	Self-report	Agency subscales for effort and ability	1
State Measurement Scale	Self-report	Awareness, self-checking, planning, cognitive strategy use, and effort	1
Cooper-Farran Behavioral Rating Scales (CFBRS) (Cooper & Farran, 1991)	Teacher report	Work-related subscale	1
School Attitude Assessment Survey (SAAS)	Self-report	Academic self-perceptions, attitude toward school, motivation/self-regulation, and peer attitudes	1
Self-Regulated Learning Interview Schedule (SRLIS)	Self-report	Motivation, metacognitive, behavioral	2
Motivated Strategies for Learning Questionnaire (MSLQ)	Self-report	Self-regulated learning (self-regulation and cognitive strategies subscales), motivation (intrinsic motivation and self-efficacy subscales)	1
Cognitive Assessment System (CAS) (Das & Naglieri, 1985)	Observation	Visual search, crack-the-code from the planning scale	1
Self-Regulated Learning Questionnaire (SRLQ)	Self-report	Self-concept, motivation, learning strategies	1

	Intended Population	Psychometric Properties
	Preschool students	*Inter-rater reliability of coding:* Three variables were coded for two tasks: *latency to frustration, duration of frustration*, and *intensity of frustration*. Reliabilities for the coded *latency to frustration* scores were within 2 seconds difference in 86% of the judgments. *Duration of frustration* codes were reliable within 2 seconds difference for 86% of the judgments. *Intensity of frustration:* Cohen's kappa = .74 (Toy task), .88 (Circle task); percent agreement = .82; (Toy task), .93 (Circle task) (Source: Howse, Calkins, et al., 2003)
	8- to 11-year-olds	Not reported.
	10th through 12th graders	*Unknown number of items* *Construct validity for composite scale:* Confirmatory factor analysis determined that the four subdomains had large intercorrelations (.85 to .97). (Source: Malpass et al., 1999)
	Elementary students	*16 items* *Internal consistency reliability (α):* .94 to .99 depending on item (Source: McClelland et al., 2006)
	Middle and high school students	*51 items* *Internal consistency (α):* .85 to .89 (subscales) *Construct validity:* Confirmatory factor analysis of the four-factor model yielded comparative fit index = .95. (Source: McCoach, 2000)
	High school students	Not reported.
	5th- and 6th-grade students	*Internal consistency reliability (α):* .67 to .83 (subscales) (Source: Shores & Shannon, 2007)
	6th graders	Not reported.
	8th graders	Not reported.

Trace Methodologies. Traces are "observable indicators about cognition that students create as they engage with a task" (Winne & Perry, 2000, p. 551), for example, "the frequency and pattern of highlighting text, accessing various supports for learning, and obtaining feedback from efforts to learn" (Zimmerman, 2008, p. 170). Other types of trace methods include think-aloud protocols and study diaries. These traces record students' methods of learning and when linked with immediate academic outcomes, students can see which strategies work best for them. Trace methods are more easily used in older students who have the metacognitive abilities necessary to report on their SRL processes.

Parent and Teacher Ratings. Ratings of observable SRL behaviors can be provided by parents, teachers, or other educators. Parent and teacher ratings may not be preferable to self-report due to the internal nature of much of SRL, but the advantage of such ratings is that they can provide information for young children who cannot report these phenomena easily for themselves.

Observations. Observational measures of SRL behaviors 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. Observational data are sometimes supplemented with student interviews or quantitative data collected through self-report measures or student records.

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 4-2 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,

Table 4-2. Approaches to studies of motivation

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	2
Elementary school	4
Middle school	4
High school	3
Multiple	2
What is the source of information?	
Student report	11
Teacher report	4
Parent report	2
Researcher observation	2
What is the study design?	
Cross-sectional	11
Longitudinal	4
What is the method of analysis?	
Case study	0
Bivariate	2
Multivariate	9
Multilevel	4
Is the sample generalizable?	
Sample of convenience (an existing intervention program)	15
Students identified as at-risk	2
Within school	0
Within district or region	0
Nationally representative	0
Can the study be replicated?	
Data and survey are available	14
Questionnaire is available	0
No, neither data nor survey are available	1

goal setting, imagery, or self-instruction" (p. 167). However, 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 et al., 1987), a self-report measure of 10 subscales and 80 items; the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 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. Additionally, a variety of observational measures have been developed, especially for use in younger samples.

Distribution of Study Types

Of the 15 empirical studies, only 4 were longitudinal; the other 11 were cross-sectional. Two 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 our understanding of the development of SRL could benefit from more studies that follow students from early elementary school to later grades when SRL may manifest itself differently and have different relationships with academic outcomes.

Distribution of Samples

Sample size and age also varied a great deal. The smallest sample had 37 6th- and 7th-grade 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 three of the studies, and some combination of these levels in two of the studies. None of the samples was representative on the national or even state level.

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 15 studies, 18 measures of SRL were used. Often, 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 (11) were self-report, 6 were teacher or parent ratings, and 2 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.

Distribution of Outcomes

Most studies looked at self-regulation in relation to math (6), reading (3), or other (4) academic skills. 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).

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," whereas 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, and colleagues (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).

Adler & Lange (1997) 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" (Adler & Lange, 1997, p. 115).

McClelland and colleagues (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 in their initial academic achievement and (2) differences in their 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.

Two chief limitations of the McClelland and colleagues (2006) study are relevant for the purposes of this review. First, there was significant sample attrition between kindergarten and 6th grade, from 538 to 260 students. Although a statistical method (full information maximum likelihood) was used to address this decrease, some bias likely remains 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.

Middle and High School Self-Regulation Studies

Seven of the studies that we reviewed included middle and high school students—four studies at middle school, three at high school, and two studies that sampled both. All of these studies were cross-sectional in design. Therefore, no substantial evidence base exists to inform how self-regulation may change in these older student populations.

Of the four middle school studies, two had moderately small sample sizes (fewer than 100 students) and two 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 three studies linked self-regulation with math exams, grades, and other exams. All four 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.

All three high school studies had sample sizes of between 100 and 150 students. Two of the studies included 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 and colleagues (1999) included 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.

Discussion

Although 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 and parent/teacher reports are used; in older students, self-report measures are used. Undoubtedly, mode effects cloud similarities and differences in SRL over the course of development. Some of the measurement issues found in younger populations have been addressed in populations of postsecondary students (e.g., see Boekaerts et al., 2000; Pintrich, 2004).

Still, several promising directions for SRL research are possible. 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, because of 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.

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CHAPTER 5

Self-Efficacy

Jean M. Lennon

Introduction

Since its introduction by Bandura in 1977, the concept of self-efficacy, or a person's belief in his or her ability to succeed in specific situations, 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 academic self-efficacy to understand variations in children's academic performances.

It should be noted at the outset that academic self-efficacy is included in this volume because of its importance for understanding academic performance independent of the child's objective cognitive ability or skill. It is inaccurate to label it a noncognitive skill because it involves cognitions and is a belief rather than a skill per se.

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 before 1997, when necessary, to convey the state of the literature.

Our first task involved scanning the literature to identify recent publications on self-efficacy and academic outcomes. Search terms included *self-efficacy*, *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 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 had to occur earlier. Studies addressing only nonacademic outcomes, such as depression or psychological distress, were excluded. This approach yielded 27 articles for this review.

Conceptual Definition

Self-efficacy is a concept drawn from Bandura's (1977) broad theory of the person, which posits that human achievements depend on 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 effective performance. As outlined by Bandura (1993), students with high academic self-efficacy

- view problems as challenges to be mastered instead of threats and set goals to meet the challenges;
- are committed to the academic goals they set;
- have a task-diagnostic orientation, which provides useful feedback to improve performance, rather than a self-diagnostic orientation, which reinforces the student's low expectation about what he or she can accomplish;
- view failures as a result of insufficient effort or knowledge, not as a deficiency of aptitude; and
- 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 may 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.

For the remainder of this chapter, we use the shortened term *self-efficacy* to refer to academic self-efficacy.

Relationship to Other Concepts

A number of concepts are sometimes confused with self-efficacy, including academic self-concept, outcome expectations, perceived control (or sense of control), and self-esteem. We review each of these briefly in turn, before we turn to studies focusing on self-efficacy.

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. Broadly speaking, self-concept is a person's view of him- or herself. 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 evaluative and affective components (Bong & Clark, 1999). The evaluative component entails an assessment of ability based more on normative, comparative standards (e.g., "Can I get as many problems correct as most other students?"), the result of which can trigger an affective response (e.g., "I cannot, so I must be dumb"). In contrast, 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?"). That self-concept, but not self-efficacy, involves an affective reaction to the evaluation of competency that is illustrated in a study by Pietsch, Walker, and Chapman (2003). They conducted a factor analysis of items from a mathematics self-efficacy measure and a mathematics self-concept measure. The self-efficacy items loaded on the same factor as the items from the competency component of the self-concept measure, but not the affective component of the self-concept measure.

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

Perceived control is sometimes considered part of self-efficacy, but it is not identical to it (Schunk & Pajares, 2002). Perceived control is a general perception the student has regarding his ability to control how he 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.

Self-Esteem

Although definitions of self-esteem vary, most accounts refer to a person's general sense of self-worth. Self-efficacy, the belief in one's ability to succeed in specific situations, is distinct from self-esteem in that success in a specific situation may or may not be related to one's sense of self-worth (Pajares, 2002). A child who believes she has the ability to perform well on reading comprehension questions may have very low self-esteem if the child looked to other things, such as the number and closeness of friends, to determine her self-worth. Likewise, a child could have low academic self-efficacy but high self-esteem if the child's performance in sports played a greater role in his evaluation of his own self-worth.

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

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 & De Groot, 1990)—however, is that some items begin with a statement such as "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 et al., 1996).

This section gives an overview of the number and types of measures currently used in the field of self-efficacy research. Table 5-1 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. Several studies examined self-efficacy within larger scales measuring a wide variety of concepts, such as aggression, attention shifting, and self-esteem. In addition, multiple types of self-efficacy were measured, including academic self-efficacy, self-efficacy for self-regulated learning, and social self-efficacy. The focus of this chapter is on academic self-efficacy. However, the relationship between academic self-efficacy and other types of self-efficacy (e.g., self-regulatory and social self-efficacy) are discussed.

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 Students' 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 .77, which is acceptable given that the scale has 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 = .28 and .29, respectively). These smaller correlations are likely a result of the generic nature of the self-efficacy assessment and the broad type of performance metrics used.

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 27 studies reviewed was a meta-analysis, so it is not included in the tallies shown in Table 5-1.

Table 5-1. Selected measures of self-efficacy: Key features

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
Activities and Accomplishment Inventory (AAI)	Student report		1
Adjustment Scales for Preschool Intervention (ASPI)	Teacher report	Aggression, opposition, inattentive-hyperactivity, withdrawal-low energy, and social reticence	1
Children's Behavior Questionnaire	Parent and teacher report	Anger, approach, attention, inhibitory control	1
Children's Multidimensional Self-Efficacy Scales	Student report	Self-efficacy for self-regulated learning scale; Self-efficacy for academic achievement scale	2
Early Adolescent Temperament Questionnaire	Student and parent report	Attention shifting, activation control, and inhibitory control	1
Head-to-Toes Task	Student report	Inhibitory control, attention, and working memory	1
Index of Self-Efficacy for Writing (ISEW)	Student report	Planning, translating, and reviewing	1

Intended Population	Psychometric Properties
High school	*8 items* Not reported.
Head Start children	*144 items* *Internal consistency reliability (α):* .78 to .92, depending on subscale (Source: Fantuzzo et al., 2007)
3- to 5-year-olds	*16 items* *Internal consistency reliability (α):* .74 to .91 (teachers); 51 to .71 (parents), depending on subscale *Construct validity:* Factor analysis revealed a single factor accounting for 71% of the variance in the subscales for teachers and a single factor accounting for 44% of the variance for parents. (Source: Blair & Razza, 2007)
High school	*20 items* *Internal consistency reliability (α):* .87 (self-regulated learning scale); .70 (self-efficacy for academic achievement scale) (Source: Zimmerman et al., 1992)
7- to 12-year-olds	*18 items* (parents); *16 items* (students) *Internal consistency reliability (α):* .83 (parent report); .65 (student report) (Source: Valiente et al., 2007)
Not specified	*10 items* *Concurrent validity: r* = .33 to .38 (Social Skills Rating System); *r* = .21 to .27 (Child Behavior Rating Scale) *Internal consistency reliability (α):* .95 (self-corrections); .98 (overall) (Source: McClelland et al., 2007)
Upper elementary school students	*36 items* *Internal consistency reliability (α):* .92 (person reliability); .98 (item reliability) (Source: Smith et al., 2002)

(continued)

Table 5-1. Selected measures of self-efficacy: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
The Middle School Self-Efficacy Scale (for career decision- making)	Student report	Career decision-making process items (self-efficacy, outcome expectancies, intentions/goals subscales) Content items (math and science self-efficacy, math and science outcome expectancies, math and science intentions/goals subscales)	1
Morgan-Jinks Student Efficacy Scale (MJSES)	Student report	Talent, effort, task difficulty, and context	1
Motivated Strategies for Learning Questionnaire	Student report	Self-efficacy (but omitted items dealing with normative comparisons)	3
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	2
Perceived Self-Efficacy Scale	Student report	NA	1
Problem-referenced self-efficacy	Student report	Six subject areas: English, Spanish, US history, algebra, geometry, and chemistry	2
Researcher-developed scale, including some items from Bachman's School Ability Self-Concept Index	Student report	Academic self-efficacy	1
Researcher-developed scale	Student report	NA	1

	Intended Population	Psychometric Properties
	Middle school students	*47 items* *Internal consistency reliability (α):* .70 to .79 (process scale); .56 to .84 (content scale), depending on subscale *Construct validity:* Confirmatory factor analyses showed acceptable fit of the three subscales for the process items (*adjusted goodness of fit* = .91). The three-subscale solution for the content items was unacceptable (*adjusted goodness of fit* = .78), but the three-subscale structure was satisfactory for the math items only (*adjusted goodness of fit* = .91). (Source: Fouad et al., 1997)
	Middle school students	*34 items* *Internal consistency reliability (α):* .82 (overall); .66 to .78 (subscales) (Source: Jinks & Morgan, 1999)
	Middle and high school	*36 items* Not reported.
	Middle school students	*34 items* *Internal consistency reliability (α):* .62 to .85, depending on subscale (Source: Meyer et al., 1997)
	8th graders	*Number of items not reported* *Internal consistency reliability (α):* .84 to .90, .89 (median) (Source: Brookhart et al., 2006)
	High school	*42 items* *Internal consistency (α)* = .86 to .97, median = .91 *Construct validity:* Treating the six subject subscales as correlated first-order factor produced the best model fit in confirmatory factor analyses (CFI = .95). (Source: Bong, 1997)
	High school	*8 items* *Internal consistency reliability (α):* .89 (Source: Saunders et al., 2004)
	Elementary, middle, and high school	*Internal consistency reliability (α):* .83 (Source: Usher & Pajares, 2008)

continued

Table 5-1. Selected measures of self-efficacy: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
Researcher-developed task assessing specific math self-efficacy	Student report	NA	1
Self-Assessment Questionnaire (SAQ)	Student report	Perceived math ability, perceived effort exerted in math tasks, perceived value of math, perceived math self-efficacy	1
Self-efficacy 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)	1
Self-Efficacy for Learning Scale (SELS)	Student report	NA	1
Self-Efficacy Questionnaire for Children (SEQ-C)	Student report	Social self-efficacy, academic self-efficacy, emotional self-efficacy	1
Self-efficacy scale	Student report	NA	2
Sources of Academic Self-Efficacy Scale (SASES)	Student report	Personal performance accomplishment, vicarious learning, social persuasion, and emotional arousal	1

Intended Population	Psychometric Properties
High school	*20 items* *Internal consistency reliability (α):* .87 to .95, depending on subsample (Source: Stevens et al., 2004)
High school	*26 items* (domain general); *8 items* (domain-specific) *Internal consistency reliability (α):* .62 to .87 (domain general SAQ); .88 to .93 (domain-specific SAQ) (Source: Hong & Aqui, 2004)
9th graders	*6 items* *Internal consistency reliability (α):* .78 (Source: Eaton & Dembo, 1997)
High school	*11 items* *Internal consistency reliability (α):* .87 *Construct validity:* Scores on the measure were negatively correlated with the Children's Depression Inventory, as predicted by theory (r = –.10 to –.47). (Source: Hampton & Mason, 2003)
High school	*24 items* *Internal consistency reliability (α):* .88; .85 to .88, depending on subscale (Source: Muris, 2001)
High school	*7 items* Not reported.
High school	*Number of items not reported.* *Internal consistency reliability (α):* .91 overall; .79 to .87, depending on subscale *Criterion validity:* Source of Mathematics Efficacy Scale (r = .57); General Self-Esteem Scale (r = .45); Academic Locus of Control Scale (r = .51) (Source: Hampton & Mason, 2003)

continued

Table 5-1. Selected measures of self-efficacy: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure
Students' Approaches to Learning (SAL)	Student report	1 of 14 subscales relates to self-efficacy, with others covering cognitive and metacognitive learning strategies (elaboration strategies, memorization strategies, control strategies); motivational preferences (interest in reading, interest in mathematics, instrumental motivation, effort and persistence in learning); self-related cognitions and beliefs (verbal self-concept, math self-concept, academic self-concept, and control expectations); preferences for learning situations (cooperative and competitive)	1
Teacher and Student Efficacy Beliefs Survey	Teacher and student report	Using prior knowledge, self-monitoring, cooperative learning, and using graphic organizers	1

	Intended Population	Psychometric Properties
	High school, in 25 countries, including the United States	*52 items* *Internal consistency reliability (α):* .83 in the United States, .75 for all 25 countries included *Content Validity:* 14-factor model fit the data well for US sample and for all 25 countries (Tucker-Lewis Coefficient = .97 for both). *Criterion Validity:* Self-efficacy scores correlated with reading achievement scores (r = .28) and math achievement scores (r = .29). (Source: Marsh et al., 2006)
	Middle school students	*40 items* *Internal consistency reliability (α):* .70 to .84 (students); .73 to .89 (teachers) (Source: Barkley, 2006)

Distribution of Study Types. Table 5-2 presents information on the studies reviewed. Of the 26 empirical studies, only 5 were longitudinal; the remaining 21 were cross-sectional. Two of the longitudinal studies included preschool samples. One longitudinal study was conducted at each of 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 studies with rigorous longitudinal designs that can establish a time-order relationship in addition to simple correlational relationships.

Distribution of Samples. Sample size and age also varied a great deal. The smallest sample had 14 students in grades 5 and 6; the largest contained 3,760 students in grades 4 through 11. As seen in Table 5-2, the majority of studies concerned high school students. 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.

Distribution of Measures. Across the 26 studies, 24 measures of self-efficacy were used, highlighting the great variability in assessments of self-efficacy. Given Bandura's (2006) recommendation to construct task-specific measures, the great number of measures might simply reflect the variety of academic tasks under study. 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 (20) were self-report, 1 was a teacher rating, and 3 relied on a combination of student/teacher or teacher/parent ratings. As expected, the procedures used for these measures 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 for grades in general). Three looked at classroom exam scores, and five had other outcome measures, such as teacher ratings. 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).

Table 5-2. Approaches to studies of self-efficacy

Study Approach	Count of Studies Using This Approach
What is the study design?	
Cross-sectional	21
Longitudinal	5
At what grade level is the construct measured?	
Preschool	3
Elementary school	3
Middle school	4
High school	9
Multiple	7
What is the source of information?	
Student report	22
Teacher report	3
Parent report	1
Researcher observation	0
What is the method of analysis?	
Case study	1
Bivariate	2
Multivariate	21
Multilevel	2
Is the sample generalizable?	
Sample of convenience (an existing intervention program)	26
Within school	26
Within district or region	0
Nationally representative	0
Can the study be replicated?	
Data and survey are available	5
Questionnaire is available	18
No, neither data nor survey are available	3

Note: Not all studies reported each study approach characteristic, so details may not always sum to total.

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 grade 12, we limit our review to the first class of outcomes.

Meta-Analysis of Research from 1977 to 1988

The past two decades 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) that summarized all such research conducted from 1977 through 1988. This period marks the first decade after Bandura's introduction of the construct. Multon and colleagues' meta-analysis examined the relationship between self-efficacy and academic performance on the one hand and persistence in academic tasks on the other. The meta-analysis included 38 samples from 36 studies for academic performance and 18 samples from 18 studies for academic persistence. The overall effect size estimates (Pearson's *r*) were .38 for performance and .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 with 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, or 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 (e.g., subtraction problems, reading comprehension problems) (r = .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. It is also possible that there were differences in measurement modes (e.g., self-report versus teacher rating) by age group that could affect relationships with outcomes.

Research conducted since 1988 has generally supported the conclusions of the Multon and colleagues meta-analysis. In particular, later research (see Pajares, 1996, for a review) has underscored the importance of the third factor listed above, the association of the type of performance measure with the magnitude of the relationship.

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

Mediational Analyses Involving Self-Efficacy

More recent research on self-efficacy and academic achievement has often examined 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 a direct effect of self-efficacy on persistence and achievement.

Bandura and colleagues (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 three types of self-efficacy: academic (managing one's own learning; mastering academic subjects; fulfilling personal, parental, and teacher academic expectations), social (peer relationships, self-assertiveness, leisure time activities), and self-regulatory self-efficacy (belief that one can resist peer pressure to engage in high-risk activities). The findings involved relationships among 13 variables, including the three types of self-efficacy. With respect to academic self-efficacy, the authors found that its effect 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 and colleagues (1992) tested a causal model explaining final grades in social studies among 102 9th- and 10th-grade students. Self-efficacy for using self-regulated learning strategies 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 self-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 percent of the variance in final social studies grades.

As discussed earlier, a reciprocal or cyclical relationship exists 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 and colleagues (2008) examined whether self-efficacy mediated the link between self-regulatory processes and math and literacy achievement in 733 children followed from grade 1 through grade 3. 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 grade 1 contributed to self-efficacy in grade 2, which contributed to literacy or math achievement in grade 3. Although 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 and colleagues' (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. Sex 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 was 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 children's academic outcomes. These mediational 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.

Variations by Sex 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 (2002) 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, for example, indicating whether they thought they could complete a written assignment on a certain topic. 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. This discrepancy suggests that more research is needed to best understand sex differences in self-efficacy.

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. 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.

Discussion

Self-efficacy has been found to have an impact on academic performance. Furthermore, the studies reviewed also indicated that it can be improved, making this a worthy area of further research and investment. Self-efficacy 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), although it is important to note that Bandura (2006) has recommended more specific measures relative to more general ones. 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).

The survey of measures presented here underscores both the opportunities and the risks in the field. A large number of measures of academic self-efficacy were used, which could reflect a commitment to measuring with great specificity in different academic settings. However, there were clearly instances in which multiple measures were used for the same specific tasks and cases in which researchers modified existing instruments to create their own, untested instruments. Although greater specificity of the measures is

desirable, customization must occur in the context of a thorough psychometric evaluation (Bandura, 2006).

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CHAPTER 6

Academic Self-Concept

Jeffrey A. Rosen

Introduction

Academic self-concept has a research history spanning decades and is often mentioned as an important factor in educational attainment. Although there appears to be some agreement on the definition of academic self-concept, issues remain unsettled. The purpose of this chapter is to provide researchers with some insight into academic self-concept; specifically, the measurement approaches employed and how this attribute relates to important educational attainment outcomes. This chapter also discusses the conceptual definition of this attribute. There is clearly an increasing interest in noncognitive attributes in the educational research community, and this chapter provides researchers with some important information to aid in decisions on whether to account for academic self-concept in their studies of educational attainment.

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 toward school and toward 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. Third, the major findings on the relationship between academic self-concept and educational attainment outcomes in the most recent literature will be reviewed and suggestions for future research will be offered.

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 studies that focused on the relationship between academic self-concept and some aspect of academic achievement. For the review of academic self-concept, we excluded

studies that (1) focused on parents, teachers, or administrators as the unit of analysis; and (2) focused only on a psychometric evaluation of an instrument measuring academic self-concept. This process resulted in a final sample of 42 articles that serve as the basis of this review.

Conceptual Definition in the Educational Context

Unlike some other constructs studied in this review (e.g., motivation and effort), the underlying conceptual definition of academic self-concept seems largely settled. 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 environment (O'Mara et al., 2006; Valentine et al., 2004). Regardless of the scope of specific research, researchers generally employ this central definition of academic self-concept.

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.

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 multidimensional and varies across school subjects. 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 literacy self-concept (i.e., students' belief that they can do well in reading or language arts). The educational psychology literature 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

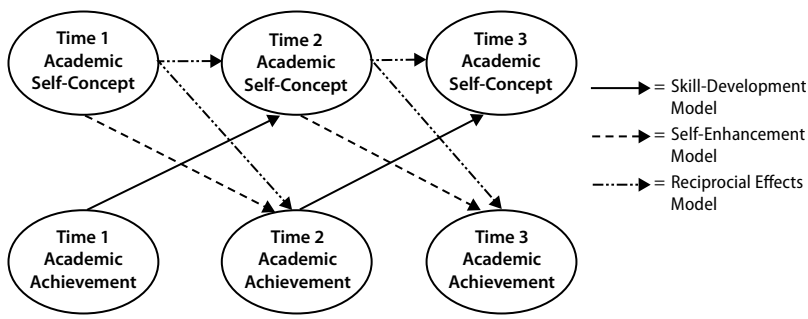
literature is beyond the scope of this review, but to understand the relationship between academic self-concept and academic achievement outcomes, it is necessary to recognize that general and domain-specific self-concepts may be different.

The Causal Relationship Between Academic Self-Concept and Achievement

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. The question of causality between academic self-concept and achievement outcomes has been featured prominently in the academic self-concept literature. However, the direction of causality remains somewhat unsettled; three popular models describe different causal relationships between self-concept and academic 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. Academic 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 a strong 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 6-1 shows the hypothesized self-concept-to-achievement causal relationships in all three models over three time periods.

Figure 6-1. Hypothesized causal relationships in the skill-development, self-enhancement, and reciprocal effects models



Measurement Approaches

In this section, we discuss the specific approaches researchers have used to measure academic self-concept. Given the subjective nature of self-concept, a student self-report measurement approach is most appropriate. There are a few well-known survey instruments that are widely used to measure self-concept: the Self-Description Questionnaire (SDQ), the Academic Self-Description Questionnaire (ASDQ), and the Self-Perception Profile for Children/for Adolescents (SPP-C and SPP-A).

Self-Description Questionnaire and 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 general self-concept in this literature. The SDQs measure multiple domains of self-concept, including some academic domains such as math and verbal abilities. From these instruments, the more scholastically focused ASDQ (see Marsh, 1990, 1992; see also Byrne, 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. A review of the psychometric properties of the ASDQ can be found in Byrne (1996), who noted that the basic structure 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 overall self-concept. 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 Likert scale with the following labels: *definitely false* (1), *false* (2), *mostly false* (3), *more false than true* (4), *more true than false* (5), *mostly true* (6), *true* (7), and *definitely true* (8).

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, both versions of the SPP measure multiple domains, including academic self-concept, athletic competence, social acceptance, physical appearance, job competence, close friendships, romantic appeal, behavioral conduct, and global self-worth. However, unlike the ASDQ, academic domains (e.g., math, science) are not individually measured.

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." Example 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"; and (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. Researchers including Bouchey and Harter (2005) have adapted these scales to assess domain-specific academic attitudes about skills such as math and science. They assessed adolescents' perceived math and science competence by modifying 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.

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 in a limited number of studies. 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." These items are similar in directness and complexity to that of the ASDQ items. Several independent evaluations suggest that the PASS has good psychometric properties (e.g., Byrne, 1996).

Several other self-concept instruments include academic subscales but were not used in any of the reviewed studies. However, they are used frequently enough in self-concept research that they warrant a brief mention here. The Multidimensional Self-Concept Scale (MSCS) (Bracken, 1992) includes an academic self-concept subscale, along with self-concept scales in other domains. Questions on the academic subscale of the MSCS include "I frequently feel unprepared for class," "I am good at mathematics," "I am proud of my school work," and "I work harder than most of my classmates." The

Table 6-1. Measures of academic self-concept: Key features

Measure Name	Data Source	Subscales or Components	No. of Items	No. of Studies Using This Measure	Intended Population
Self-Description Questionnaire (SDQ) (Marsh, 1992) SDQ I: preadolescents; SDQ-II: adolescents; SDQ-III: late adolescents/young adults	Student	Academic domain-specific measures of self-concept	Varies	6	Multiple ages
Academic Self-Description Questionnaire (ASDQ) (Marsh, 1990, 1992; also see Byrne, 1996) ASDQ-I: preadolescents; ASDQ-II: adolescents; ASDQ-III: late adolescents	Student	Academic domain-specific measures of self-concept	Varies	4	Multiple ages

Piers-Harris Self-Concept Scale (Piers & Harris, 1969) includes an Intellectual and School Status subscale that assesses a child's perceived abilities with respect to intellectual and academic tasks. Finally, the Tennessee Self-Concept Scale, Second Edition (TSCS:2) (Fitts & Warren, 1996), includes an overall self-concept rating as well as six subtest scores, one of which is academic self-concept. The total self-concept score measures the degree to which a person views him- or herself as competent and valuable. Table 6-1 outlines some key features of self-concept measures.

Example Articles	Psychometric Properties
Pietsch et al. (2003)	*Content validity:* Based on Shavelson et al. (1976) multifaceted, hierarchical model of self-concept. *Construct validity:* Exploratory and confirmatory factor analysis provides strong empirical foundation for the measures. Evidence for relationships with academic achievement, self-efficacy for academic success/failure, age, gender, reading ability, study skills, test anxiety, study processes, and masculinity/femininity. *Reliability:* High levels of alpha internal consistency reliability estimates for all scales, ranging from .76 to .90. Stability estimates range from .61 to .80s. (Source: Impara & Blake, 1998)
Marsh & Yeung (1997b)	*Content validity:* ASDQ based on the Self-Description Questionnaire developed from the Shavelson et al. (1976) model (see descriptions by Marsh, 1990, 1992). The SDQ has demonstrated high-quality psychometric properties (Marsh & Yeung, 1997b). The self-esteem scale was an 8-item scale adapted from the SDQ instruments (Marsh, 1990, 1992) that was based on the Rosenberg (1965) scale. Reliability estimates were .90 and .85 for the school esteem and self-esteem scales, respectively, and varied from .88 to .95 (median = .93) for the school-specific scales. Exploratory and confirmatory factor analyses (Marsh, 1990) provided a well-defined solution for a priori ASDQ factors, thus providing support for the ASDQ responses. *Internal consistency:* Marsh & Yeung (1997b) found high omega estimates of reliability for Waves 1, 2, and 3: (a) English self-concept was .90, .92, and .89; (b) math self-concept was .95, .94, and .94; and (c) science self-concept was .95, .94, and .94.

(continued)

Table 6-1. Measures of academic self-concept: Key features*(continued)*

Measure Name	Data Source	Subscales or Components	No. of Items	No. of Studies Using This Measure	Intended Population
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
Perception of Ability Scale for Students (PASS)	Student	Reading, spelling, language arts, math, and printing/writing	70	1	Upper elementary school, grades 3 through 6
Reading Self-Concept Scale (RSCS)	Student	Academic domain-specific measures (competence, difficulty, attitude subscales)	30	1	Multiple ages

Example Articles	Psychometric Properties
Bouchey & Harter (2005)	*Construct validity, SPP-C:* Exploratory and confirmatory factor analyses examining the five domain-specific subscales show mixed results, with some studies finding evidence to support the developers' factor structure (Granleese & Joseph, 1993, 1994; Van Dongen-Melman et al., 1993) and other studies finding only partial support (Gavin & Herry, 1996; Schumann et al., 1999; Van den Bergh & Van Ranst, 1998; Veerman et al., 1996). *Reliability, SPP-C:* Internal consistency reliabilities reported for subscales ranging from .71 to .84 (Harter, 1985), .62 to .74 (Hess & Petersen, 1996), and .86 to .92 (Eapen et al., 2000). Test-retest correlations reported by Muldoon (2000) over a 2-year period for all subscales except social acceptance were statistically significant, ranging from .35 to .47. *Internal consistency, SPP-A:* Bouchey & Harter (2005) measured adolescents' perceived academic competence using modifications of the five academic subscale items from the What I Am Like scale of the SPP-A (Harter, 1988) and found Cronbach's alpha to be .80. (Source: Shevlin et al., 2003)
Chapman et al. (2000)	*Construct validity:* Factor analysis, item difficulty, and item discrimination (point biserial correlations) reduced 143 items down to 70 and helped identify subscales in a standardization sample of 310 Canadian children in grade 3. These analyses were repeated on a second standardization sample of 642 children from middle-income families in grades 3 through 6 in Canada using the 70-item PASS test; findings were consistent with the initial standardization sample results. Evidence of content, criterion, and construct validity are also reported in the manual. *Internal consistency:* For the full scale, $\alpha = .91$ for the standardization sample of $N = 310$; $\alpha = .92$ for the standardization sample of $N = 642$; and $\alpha = .93$ for a third standardization sample of 831 children from middle-income families in grades 3 through 6 in the United States. The confidence subscale produced an alpha of .69, and the other subscales had an alpha greater than .75. *Test-retest reliability:* For the full scale and subscales, correlations ranged between (a) .71 and .83 over a 4- to 6-week period in a sample of 603 children, (b) .55 and .75 over a 1-year period for a sample of 932 children, and (c) .49 and .67 over a 2-year period in the same sample of 932 children. (Source: Conoley & Impara, 1995)
Chapman & Tunmer (1995)	*Construct validity:* Chapman & Tunmer (1995) found evidence of validity and reliability in a series of cross-sectional studies of elementary school children from New Zealand across 5 years (*n* ranged from 267 to 771). Confirmatory factor analysis resulted in three subscales. Significant relationships were found between subscales and reading performance, especially among older children ($r = .40$ to .65). *Internal consistency:* Cronbach's alpha ranged from .81 to .89 across age groups for the full scale, .79 to .81 for the attitude subscale, .70 to .80 for the difficulty subscale, and .63 to .82 for the competence subscale. (Source: Chapman & Tumner, 1995)

(continued)

Table 6-1. Measures of academic self-concept: Key features*(continued)*

Measure Name	Data Source	Subscales or Components	No. of Items	No. of Studies Using This Measure	Intended Population
Multidimensional Self-Concept Scale (MSCS) (Bracken, 1992)	Student	Academic domain-specific measures of self-concept	150 items (25 items per scale)	0	Grades 5 through 12
Piers-Harris Self-Concept Scale (Piers & Harris, 1969)	Student	Intellectual and School Status subscale	60 items	0	7 to 18 years
Tennessee Self-Concept Scale, Second Edition (TSCS:2) (Fitts & Warren, 1996)	Student	Overall self-concept rating, six subtest scores including academic self-concept	76-item child form and 82-item adult form	0	Multiple ages (child form ages 7 to 12, adult form ages 13 and older)

Example Articles	Psychometric Properties
NA	*Content validity:* Based on Shavelson et al.'s (1976) multifaceted, hierarchical model of self-concept (as cited in Conoley & Plake, 1998). *Internal consistency:* Using standardization sample of 2,501 students in grades 5 through 12, α = .98 for the total scale; α ranged from .87 to .97 for the six subscales. Alphas for the separate grades ranged from .97 to .99 for the total scale and .85 to .97 for the subscales. *Test-retest: r* = .90 for the total scale and .73 to .81 for the subscales, in a sample of 37 students over a 4-week period.Concurrent validity: Demonstrated strong correlations with the Coopersmith Total Scale (*r* ranged from .57 to .73) and Piers-Harris subscales (*r* ranged from .66 to .77, for theoretically consistent scales) in a study of 65 students in grades 5 and 6. Correlations also found with the Self-Description Questionnaire-II (*r* ranged from about .40 to .74) for theoretically similar scales (*n* = 35). *Discriminant validity:* Evidence of discriminant validity was found in two studies comparing MSCS scores to Assessment of Interpersonal Relations scores. *Construct validity:* Conjoint factor analysis of five instruments (Coopersmith, Piers-Harris, Self-Esteem Index, Tennessee Self-Concept Scale, and the MSCS) supported one global self-concept factor and six dimensions corresponding to the six MSCS subscales. All MSCS subscales showed high significant loadings (ranging from .55 to .81), except the Competence Scale (nonsignificant factor loading of .29). (Source: Conoley & Plake, 1998)
NA	Normed in 1960 on 1,183 students in grades 4 through 11 in a single Pennsylvania school district. *Test-retest reliability:* Generally .70 or higher. *Internal consistency coefficients:* All above .83.
NA	*Internal consistency:* Cronbach's alpha ranged from .73 to .93 for the subscales and total score on the adult and child forms. *Test-retest: r* ranged from .47 to .82 for the adult form and .55 to .83 for the child form for the subscales and total score, over a period of 1 to 2 weeks. *Construct validity:* Principal component analyses provide adequate evidence of construct validity in terms of separation of positive and negative items. Factor analyses support two factors based on positive and negative items for the academic and family subscales on the child form; and for the physical, moral, family, and academic subscales on the adult form. (Source: Impara & Plake, 1998)

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. Studies show that students feel more competent in academic areas in which they achieve well (Denissen et al., 2007). Both global and academic domain-specific self-concept are positively related to academic achievement, measured by grades and test scores. Given the consistency of this finding, the remainder of this section focuses on the causal ordering of academic self-concept and achievement, mediators of academic self-concept and achievement, sex issues in academic self-concept development, and how academic self-concept may change through schooling.[1]

Evidence on Causality

As stated previously, the issue of causality—whether academic self-concept demonstrates a causal relationship to achievement or vice versa—is an often-studied and unsettled issue in academic self-concept research. Overwhelmingly, the evidence suggests that academic self-concept and achievement are positively related. The causal ordering question, however, is very much in doubt, and strong evidence exists to suggest that academic self-concept cannot play a simple causal role in explaining academic achievement.

In a series of studies spanning nearly 10 years, Marsh and colleagues (Guay et al., 2003; Marsh & Yeung 1997a, 1997b, 1998; Marsh et al., 2005) consistently reported that academic self-concept causes subsequent changes in academic achievement. However, they also reported that the reverse is true: achievement causes changes in academic self-concept. Therefore, they suggest support for the reciprocal effects model.

In a sample of Australian upper-middle and high school students, Marsh and Yeung (1997b) provided early evidence supporting the reciprocal effects model. In the path models they estimated, they found that academic achievement (reading, science, and math) positively predicted subsequent academic self-concept. This predictive relationship was slightly stronger than the predictive relationship between academic self-concept and subsequent achievement; however, these data appear to support the idea that both academic self-concept and achievement can influence the other. Testing

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

students at two points in time during the same school year, Marsh and colleagues (2005) again found reciprocal effects between math self-concept and achievement. In this longitudinal research, the strongest correlate of math self-concept in the middle of 7th grade was math self-concept at the beginning of 7th grade. Math self-concept at the beginning of 7th grade was also significantly related to 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. In contrast to Marsh and Yeung's (1997b) study, in the Marsh and colleagues (2005) study, the effects of academic achievement on academic self-concept were smaller than the effects of self-concept on academic achievement, which partially supports the reciprocal effects model.

Guay and colleagues' (2003) findings also support a reciprocal effects–type 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 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. The researchers' conclusions were all based on the size of the path coefficients they estimated. Table 6-2 outlines approaches to the study of academic self-concept.

The self-enhancement model has some empirical support in the reviewed studies. Buhs (2005) examined the relationships between change in academic achievement (dependent variable) and academic self-concept, classroom engagement, victimization,[2] peer rejection, and exclusion. Higher victimization scores were associated with lower academic self-concept. Higher levels of exclusion significantly predicted lower academic self-concept and lower classroom engagement scores. Lower academic self-concept was linked to both lower classroom participation and to lower values on the change in achievement dependent variable. Academic self-concept was linked to engagement, but also linked *directly* to achievement change. Engagement did not fully mediate the relationship between academic self-concept and

[2] The authors used the following items to measure victimization: "How often do the kids in your class pick on you at school?"; "How often do the kids in your class say mean things to you at school?"; "How often do the kids in your class say bad things about you to other kids at school?"; and "How often do the kids in your class hit you at school?"

Table 6-2. Approaches to studies of academic self-concept

Study Approach	Count of Studies Using This Approach
At what grade level is the construct measured?	
Preschool	1
Elementary school	10
Middle school	5
High school	14
Multiple	12
What is the study design?	
Cross-sectional	9
Longitudinal	33
What is the method of analysis?	
Bivariate	2
Multivariate	9
Multilevel	31
Is the sample generalizable?	
Within school	3
Within district or region	33
Nationally representative	6
Can the study be replicated?	
Data and survey are available	8
Questionnaire is available	22
No, neither data nor survey are available	12

achievement. Effect sizes were low to moderate. Although 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).

The skill-development model was often empirically supported in the studies reviewed here. In a longitudinal study of young children just beginning school, Chapman and colleagues (2000) presented evidence that academic self-concepts form in response to early learning experiences. The authors selected 60 5-year-olds (from an original sample of 152 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 percent represented the study's positive

academic self-concept group, the bottom 15 percent represented the negative academic self-concept group, and the modal 15 percent 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 self-concept and negative self-concept group memberships were predicted 80 percent and 65 percent of the time, respectively. Typical group membership was predicted 40 percent 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[3] experiences are likely driving academic self-concept formation.

Chapman and colleagues went on to show how academic 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 children with positive academic self-concept. Furthermore, differences emerged between children with negative and typical (modal) academic self-concept. At the end of their first year of schooling, children with negative academic self-concept had poorer reading skills than children with typical academic self-concept. And, by the middle of their third year, children with negative academic self-concepts had poorer reading word recognition and reading comprehension skills than children with typical academic self-concept.

Gonida and colleagues (2006) provided evidence that emphasizes the significance of school achievement in formulating subsequent responses. In a sample of 187 5th and 6th graders, students completed self-concept measurements twice, 1 year apart. Thus, 5th graders were retested when they were 6th graders, and 6th graders were retested when they were 7th graders and had moved from elementary to high school.[4] The authors tested multiple causal models of self-concept and achievement, finding the strongest evidence for the model where school achievement influences academic self-concept.

3 The authors only examined reading.

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

For the simple relationships tested, Time 1 school achievement significantly predicted Time 2 academic self-concept.

Herbert and Stipek (2005), in a sample of 345 elementary school 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 grades, child competency ratings were gathered in kindergarten or 1st grade and again in 3rd grade and 5th grade. Using the child's self-competency ratings, the authors examined self-concept in literacy and in math and its relationship to 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 sex. 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.

Although 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), the authors found that, initially, self-perceptions of academic competence were moderately predictive of academic performance 1 year later, accounting for roughly 16 to 25 percent 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 causally related to academic performance and not simply related, we would expect that self-concept should not only predict achievement, but also predict changes in achievement. In the authors' words,

> *We would expect that perceptions of competence at time 1 would predict not just later achievement, but also the change in achievement over time, that is, the performance of those participants who rated themselves as very competent would be more likely to improve over time, while the performance of those who rated themselves as less competent would be likely to decline over time. This relationship was not evident (p. 338).*

The evidence reported by Stringer and Heath suggests that academic self-concept may not play a simple role in helping to explain academic achievement.

Mediators of Academic Self-Concept and Achievement

A few studies reviewed here point to some potentially important mediating variables. Bouchey and Harter (2005) and Herbert and Stipek (2005) suggested that *adult perceptions of competence* and *scholastic behavior* may help explain the relationship between self-concept and achievement. Bouchey and Harter 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. Herbert and Stipek found that parents' perceptions of their child's competence were a particularly strong predictor of their child's judgment of their skills in math. So adult perceptions appear important, but they 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, scholastic behavior (e.g., whether a student completed homework on time and how much energy was put into the school work) was significantly predicted by academic self-concept. In this model, scholastic behavior also predicted school grades. Although 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. Although 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 well documented in this study. Buhs found relatively strong relationships between academic self-concept and classroom engagement. Buhs also found a strong relationship between classroom engagement and changes in academic achievement, something that has considerable support in the literature (e.g., Furrer & Skinner, 2003; Stipek, 2002). But Buhs found a much weaker direct relationship between academic self-concept and changes in academic achievement. So, classroom engagement could prove quite important in understanding how academic self-concept and achievement are linked.

Sex and Self-Concept

Sex differences in self-concept development are well documented and generally point to similar conclusions. The literature suggests that girls have a lower self-concept than boys (Young & Mroczek, 2003), but this may vary 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 sex 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; Herbert & Stipek, 2005; Marsh et al., 1985).

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, a higher self-concept of ability was associated with a less steep decline in grades over time.

Changes in Self-Concept Over Time

Research has provided significant evidence about how self-concept changes over time. Many studies find that children (especially girls) have a declining academic self-concept through their adolescence (De Fraine et al., 2007; Eccles et al., 1993; Gonida et al., 2006; Stipek & MacIver, 1989; Zanobini & Usai, 2002). 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 and colleagues (2003) suggested that self-concept becomes more strongly associated with academic achievement outcomes over time, but this contrasts with De Fraine and colleagues (2007) who found that the association between academic self-concept and language achievement becomes weaker with age. In this study, 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. These discrepant findings suggesting that academic self-concept changes over time are an area for future research.

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 his or her 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 Yeung (1998) investigated the causal ordering of self-concept and achievement over a series of studies, often concluding that evidence exists 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. Although 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 showed how academic 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, a long history of studies

exists on the covariates of academic achievement, but few control variables are included in the studies reviewed here. A few exceptions exist (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. Including more statistical controls would go a long way toward determining whether academic self-concept strongly influences student achievement or whether 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 academic 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, 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, although 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, although 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*, likely because self-concept is a judgment about oneself and does not lend itself to be behaviorally demonstrated.

Finally, the link between self-concept and achievement might be better explained if other noncognitive constructs were considered in this relationship. Although 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. Although more work is necessary, there does appear to be a clear overlap between self-concept and important elements of achievement motivation.

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CHAPTER 7

Antisocial and Prosocial Behavior

Ben W. Dalton

Introduction

This chapter reviews recent research on antisocial and prosocial behaviors as they relate to academic outcomes. It presents an overview of conceptual issues, methodologies, measurement tools, and findings, with an emphasis on describing the empirical literature and its approaches to studying antisocial and prosocial behaviors. A selection of 41 studies from the past decade serves as the basis for discussion.

Antisocial behaviors include physical acts of violence and nonphysical behaviors such as verbal abuse or social rejection. Antisocial behaviors also include subtle forms of behavior such as withdrawal and refusal to share with or help others. Acts of aggression have commanded the most attention in the research literature, particularly through the study of bullying, which includes physical and verbal or emotional abuse. Prosocial behavior, on the other hand, represents acts that indicate positive social regard and inclusiveness. Research on prosocial behavior typically concentrates on acts of sharing and cooperation.

Research on antisocial and prosocial behavior has a fairly unified focus and few 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. Although some researchers approach antisocial and prosocial behavior through specific theoretical lenses, most work in this area is empirically driven, typically analyzing discrete behaviors instead of examining competing theoretical perspectives or outlining comprehensive conceptual frameworks.

Antisocial and prosocial behaviors relate in complex ways to physiological mechanisms, home and school social environments, and affective and cognitive pathways. When social behaviors veer into negative patterns of aggression and withdrawal, they have direct and powerful negative impacts on other students, parents, and teachers, in addition to the negative consequences

for the acting student. The complexity and high-stakes nature of antisocial and prosocial behaviors make them important targets of research and intervention.

Methods

This chapter reviews peer-reviewed literature on antisocial and prosocial behaviors published between 1997 and 2008. The works were limited to 41 journal articles that appeared in the major educational and psychological journals during the identified time frame. The basic search process is described in Chapter 1 and detailed in Appendix A. Searches were conducted by journal for articles containing the key words *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 in the antisocial and prosocial fields, including *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 research based (e.g., discussions of conceptual issues, unstructured observations, or individual psychiatric case studies), (3) were small-scale studies outside of the United States with unique populations, or (4) were intended as research guides (such as for classroom management) and not original research reports. This yielded a group of 41 articles.

Conceptual Definition

Antisocial behavior is most commonly understood as consisting of both physical acts (e.g., violence to others or to objects in the environment, disruptive or purposively distracting actions) and nonphysical acts (e.g., exclusion, rejection, humiliation, any form of verbal abuse) (Bandura, 1973). These are seen as aggressive behaviors in that they are intended to be felt 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 (Dake et al., 2003; Olweus, 1993). 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 persons. 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.

Antisocial behavior, particularly in its more severe and persistent forms, is typically characterized as the product of stressful environments (such as abuse), 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 and beliefs to form attributions and determine 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.

Although they may be indicators of larger problems, antisocial behaviors as defined here 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 a broader pattern of behavioral problems (American Psychiatric Association, 2000). These disorders, their etiology and effects, are not part of the study of antisocial behavior in the research literature reviewed here, which focuses on individual behaviors or small sets of behaviors that do not collectively represent a psychiatric diagnosis. Nevertheless, antisocial behaviors expressed early in childhood can lead to increased risk of personality disorders (Schaeffer et al., 2003), and many (but not all) of the individual behaviors indicative of antisocial personality disorder or conduct disorder as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) (e.g., destruction of property, theft) are, by definition, antisocial.

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 are a variety of types 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 et al., 2008; Wentzel & Caldwell, 1997).

Antisocial and prosocial behaviors are distinct from behaviors that are principally reactions to the social actions of others, such as compliance (i.e., following requests or directions) (Dubow et al., 2006), and 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 et al., 1997; Ryan & Shim, 2008).

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

Studies of antisocial and prosocial behavior have a history of several decades. This chapter focuses 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 where the research agenda is pointing. Before describing the substantive findings, this section discusses the range of methodologies employed and the types of measures used among the 41 reviewed articles.

Methodologies Employed

Recent research into aggression, other antisocial behaviors, and prosocial behaviors often employs geographically restricted samples, includes aggression as a focus, utilizes multiple measurement techniques, and focuses on the relationship between aggression or prosocial behaviors and their antecedents rather than between social behavior and academic outcomes. Table 7-1 tabulates some of the characteristics of the reviewed studies.

Table 7-1. 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 school	15
Middle school	8
High school	4
Multiple	10
What is the study design?	
Cross-sectional	19
Longitudinal	22
What is the method of analysis?	
Case study	2
Bivariate	5
Multivariate	32
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	32
Nationally representative	3
Can the study be replicated?	
Data and survey are available	1
Questionnaire is available	34
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).

A majority of the reviewed research (26 articles) used samples 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 US population. The national samples included one based on the US Department of Education's National Education Longitudinal Study of 1988 (Marsh et al., 2001) and two others based on multiregional independent studies (Odom et al., 2006; Stormshak et al., 1999). The vast majority of studies (including the international studies) focused on samples that were drawn from specific cities, states, or regions, and were sometimes also restricted to specific populations, such as minorities. About half of the studies (22 articles) were longitudinal, whereas 17 were cross-sectional and 2 were experimental (involving the use of short time spans).

The large majority of articles (38 articles) included an examination of antisocial behavior or attitudes, regardless of whether prosocial behaviors or attitudes were included. Twenty-four studies focused exclusively on aggression or other antisocial tendencies, whereas 13 studies included both antisocial and prosocial behaviors or attitudes as part of their analysis. Three studies focused exclusively on prosocial behaviors.

Measures of Antisocial and Prosocial Behavior

Table 7-2 presents characteristics of the most common scales/questionnaires used in the reviewed studies, including instrument name, data sources, subscales, sources, and reported psychometric properties from given studies. Table 7-2 also lists observational and experimental research protocols employed in the reviewed studies.

The majority of studies (34) used questionnaire-based methods (of students, teachers, or parents) to measure social behaviors. The remaining studies (7) used either experimental methods or observational protocols and tended to focus on preschool students. The experimental studies included two that used story-based scenarios: Thornberg (2006) used puppetry to elicit student

Table 7-2. Measures of antisocial and prosocial behavior: Key features

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Questionnaire				
Revised Class Play Instrument	Student (peers)	Physical aggression, verbal aggression, prosocial cooperation/ helpfulness	3	Elementary to middle school
Interpersonal Competence Scale	Teacher or student	Physical aggression, verbal aggression, cooperation, withdrawal, other noncognitive (e.g., social anxiety)	3	Elementary to middle school

reactions to aggressive behavior, and Giles and Heyman (2005) used fictional stories to do the same. A third experimental study used a computer-based interactive program (involving fake peers) for identifying high school student responses to proposed aggressive and risky behaviors (Cohen & Prinstein, 2006). Studies using researcher observations included one using a preexisting structured observational protocol (Odom et al., 2006) and three using study-specific protocols with various time-sampling methods (Goldstein et al., 2001; McComas et al., 2005; Pellegrini & Bartini, 2000).

However, a substantial proportion of studies used multiple sources or methods to measure student behavior. For example, one of the studies employing researcher observations also included standardized questionnaires (Pellegrini & Bartini, 2000); one of the questionnaire-based studies also used juvenile police and court records (Schaeffer et al., 2003). Among studies that were entirely questionnaire based, 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 or information from peers (20 and 16 studies, respectively, nonexclusive with other sources). Ten studies used reports from the target students themselves (again, nonexclusive).

	Example Articles	**Psychometric Properties**
	Becker & Luthar (2007); Burgess et al. (2006); Chen et al. (1997)	*4 items* on aggression/bullying reputation scale *Internal reliability (α):* .88 (urban sample), .87 (suburban sample) (Source: Becker & Luthar, 2007)
	Farmer et al. (2002); Lord & Mahoney (2007); Ryan & Shim (2008)	*3 items* on aggression subscale *Internal reliability (α):* .88 (teacher reported), .73 (student reported) *Correlation among teacher ratings:* .71, $p < .05$ (Source: Ryan & Shim, 2008)

(continued)

Table 7-2. Measures of antisocial and prosocial behavior: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Teacher Observation of Classroom Adaptation–Revised Scale (TOCA-R)	Teacher	Physical aggression, verbal aggression, prosocial cooperation/ helpfulness	2	Elementary school
Teacher-Child Rating Scale (T-CRS)	Teacher	Acting out/ disruptive behavior, helpfulness, other noncognitive skills (e.g., self-concept)	2	Elementary school
Safe Communities-Safe Schools Survey	Student (self), teacher	Physical aggression, relational aggression, victimization	2	Middle and high school
Child Behavior Checklist and Youth Self-Report	Parent, child	Aggression, anxiety, depression, hyperactivity, noncompliance, overcontrol, and undercontrol	2	Elementary to high school
Child Behavior Scale	Teacher	Aggression, prosocial behavior, asocial behavior, exclusion, hyperactivity, and anxiety	2	Elementary school
Early School Behavioral Rating Scale	Teacher	Social competence, emotional problems, and behavioral problems	1	Elementary school

	Example Articles	Psychometric Properties
	Schaeffer et al. (2003); Stormshak et al. (1999)	*10 items* on authority acceptance scale *Internal reliability (α):* .92 to .94, depending on grade *Test-retest intraclass reliability:* .65 to .79, depending on grade pair (Source: Schaeffer et al., 2003)
	Coley (1998); Morrison et al. (1998)	*5 items* on acting out subscale *Internal reliability (α):* .79 (Source: Morrison et al., 1998)
	Brockenbrough et al. (2002); Wilson (2004)	*2 to 7 items*, depending on study *Internal reliability (α):* Not reported in either study
	Lansford et al. (2005); Morales & Guerra (2006)	Number of items not reported *Internal reliability (α):* .78 (teachers) (Source: Morales & Guerra, 2006)
	Ladd & Burgess (1999); Miles & Stipek (2006)	*7 items* on aggression subscale *Internal reliability (α)*: ≥ .88 across multiple time points (Source: Miles & Stipek, 2006)
	Hoglund & Leadbeater (2004)	*9 items* on behavioral problems subscale *Internal reliability (α):* .88 (Source: Hoglund & Leadbeater, 2004)

(continued)

Table 7-2. Measures of antisocial and prosocial behavior: Key features *(continued)*

Measure Name	Data Source	Subscales or Components	No. of Studies Using This Measure	Intended Population
Preschool Behavior Questionnaire	Teacher	Social reward dependence (prosocial orientation)	1	Elementary school
Prosocial Goal Pursuit Questionnaire	Student (self)	Academic behavior and social behavior	1	High school
Social Behavior Questionnaire	Teacher	Aggression-disruptiveness, prosocial behavior	1	Elementary school
Observation				
Code for Active Student Participation and Engagement (CASPER-II)	Researcher	Social behavior (physical aggression, verbal aggression, and prosocial sharing)	1	Preschool
Study-specific: video-based coding	Researcher	Physical aggression	1	Preschool
Study-specific: direct observation	Researcher	Physical and verbal aggression, verbal prosocial behavior	2	Preschool, middle school
Experiment				
Story-based scenarios and solicited responses	Student	Physical aggression, social exclusion	2	Preschool, elementary school
Computer interactions with faux peers	Student	Physical aggression, verbal aggression, health risk behaviors	1	High school

Example Articles	Psychometric Properties
Vitaro et al. (2005)	*10 items* on prosocial scale *Internal reliability (α):* .91 (Source: Vitaro et al., 2005)
Barry & Wentzel (2006)	Number of items not reported *Internal reliability (α):* .75 (Source: Barry & Wentzel, 2006)
Veronneau et al. (2008)	*13 items* on aggression-disruptiveness scale *Internal reliability (α):* .93 (kindergarten), .92 (grade 4) *Correlation over two grades:* .47, $p < .001$ *10 items* on prosocial scale *Internal reliability (α):* .92 (kindergarten), .91 (grade 4) *Correlation over two grades:* .23, $p < .001$ (Source: Veronneau et al., 2008)
Odom et al. (2006)	*Inter-rater reliability (κ):* .79 *Average inter-rater agreement:* 94% (Source: Odom et al., 2006)
Goldstein et al. (2001)	*Inter-rater reliability (intraclass correlation coefficient):* .75 (Source: Goldstein et al., 2001)
McComas et al. (2005); Pellegrini & Bartini (2000)	*Average inter-rater agreement:* aggression (98%), prosocial behavior (96%) (Source: McComas et al., 2005)
Giles & Heyman (2005); Thornberg (2006)	*Inter-rater reliability (κ):* (solicited responses coded by observers): Physical aggression (1.00), verbal aggression (.90), relational aggression (.93) (Source: Giles & Heyman, 2005)
Cohen & Prinstein (2006)	*9 items* on study-specific aggression instrument *Internal reliability (α):* .72 (Source: Cohen & Prinstein, 2006)

The teacher and students questionnaires (and the rarer parent questionnaires) were typically drawn from existing batteries, particularly the Teacher Observation of Classroom Adaptation–Revised Scale or teacher ratings on the Interpersonal Competence Scale. For student self-ratings, scales included the Interpersonal Competence Scale, the Child Behavior Scale, the Child Behavior Checklist, the Social Behavior Questionnaire, and the Prosocial Goal Pursuit Questionnaire.

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

Peer-nomination procedures were a 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 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 et al., 1985), which provided students with a list of behavioral descriptors (such as "someone who gets mad" or "someone who spreads rumors") and a roster of class names and 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 et al., 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 (i.e., popularity), friendships, and networks (see, e.g., Wentzel et al., 2004).

In sum, the measurement of antisocial 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 et al., 2006). Teacher reports, although 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 and Bartini 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 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.

Substantive Focus and Findings

The variety of reviewed studies indicates a set of complex relationships among antisocial and prosocial behaviors; academic achievement and attainment; and other behaviors, attitudes, and social roles. Twenty-four studies examined anti/prosocial behaviors as predictors of either educational outcomes or of other social factors, such as peer acceptance and victimization. An overlapping set of 25 studies examined anti/prosocial behaviors as outcomes of either educational success itself or of other social factors. As indicated, a number of studies (10) examined multiple relationships and causal pathways simultaneously—for example, the 10 studies that examined anti/prosocial behaviors as predictors of educational outcomes included 2 studies that also examined academic achievement itself as a predictor of anti/prosocial behavior and 4 studies that also examined anti/prosocial behaviors as a predictor of other social outcomes. This coverage of interrelated issues illustrates the recognition that the study of antisocial and prosocial behaviors involves bidirectional relationships with academic and social experiences.

The focus of the studies examining anti/prosocial behavior as a predictor of educational outcomes was broadly distributed in examining achievement test scores, grades (from school transcripts), school completion, educational attainment, teacher-rated academic skills, and academic self-regulation. Of the studies that included an examination of anti/prosocial behavior as outcomes, the predictors included academic variables, such as achievement,

communication skills, and grade retention; and other noncognitive skills, such as neighborhood stressors, social goals, parental supervision, religious involvement, and initial aggressive actions.

Because of the variety of studies reviewed and the extent of overlap among them, the discussion below is organized by behavior (antisocial and prosocial), with each section discussing the behavior's role as a predictor or an outcome with respect to educational outcomes and other social outcomes.

Antisocial Behaviors. We found that in 33 of the 38 studies involving antisocial measures, 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 et al., 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 small number of studies (10) that directly addressed the relationship between antisocial behaviors and achievement or attainment as an outcome makes consistent conclusions difficult, although the majority (7) reported expected negative relationships between antisocial behavior and academic outcomes. The best studies were longitudinal and suggested that the relationship between antisocial behavior and educational outcomes was more complicated than a straightforward causal impact of behavior on achievement or attainment.

For example, Chen and colleagues (1997) found that aggressive and disruptive behavior in 4th grade predicted poor math achievement among 6th graders in China. Schwartz and colleagues (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 enhanced popularity (aggression was 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, Miles and Stipek (2006) did not find any association between earlier aggression and later achievement; however, they did find that poor academic achievement in early grades predicted aggression itself, consistent with the hypothesis that school failure may increase feelings of disengagement, frustration, and compensating behaviors. This suggests that there is a bidirectional relationship between aggression (and perhaps other types of antisocial behavior) and achievement (i.e., that academic difficulties lead to behavioral problems which in turn reinforce and extend academic problems). Therefore, supporting struggling students both academically and socially may interrupt this feedback loop and be more effective than addressing just one side of the equation (McEvoy & Welker, 2000). Such a possibility is suggested in Vitaro et al. (2005), who saw the statistical relationship between their elementary-age aggression measures and high school completion disappear after accounting for parental practices.

Cognitive deficits or learning problems can contribute to poor academic effort and disinterest in classroom activities, spurring both poor achievement and low-level antisocial behavior (e.g., disrupting class) and leading to a feedback pattern of negative outcomes. Jimerson and Ferguson's (2007) longitudinal study showed that, for example, grade retention in early grades was associated with an increase in aggressive behaviors by grade 8. Chen and colleagues (1997) found that initial math achievement positively contributed to a variety of social adjustment indices (including, negatively, aggression) and that aggression-disruption and positive social adjustment subsequently contributed to later math achievement.

Poor social outcomes may also feed this spiral of low achievement and antisocial behavior by removing mediating sources of support. Antisocial behavior, and particularly aggression, often 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 students who were also withdrawn (e.g., shy) reported even more severe problems than aggressive students who were not withdrawn (although just being withdrawn was not consistently associated with relationship problems). Similarly, Hoglund

and Leadbeater (2004) reported that physical aggression and disruption were related to declines in social competence and an increase in emotional problems. Each of these negative outcomes can contribute to lowered motivation and interest in schooling and academics (Hyman et al., 2006).

Paradoxically, however, aggression is sometimes associated with positive social outcomes like popularity and self-esteem, particularly for boys (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 leading to poor grades; likewise Farmer and colleagues (2002) noted that popularity played a role in whether boys joined aggressive groups. Other suggestive evidence comes from an experimental study showing that high-status peers often sway children to support aggressive or risky behaviors (Cohen & Prinstein, 2006). However, popularity may not provide protective social support: Becker and Luthar (2007) noted that rebellious behaviors increased peer admiration (distant liking) but lowered peer preference (wanting to associate socially). Popularity is therefore not an unalloyed good, but rather can involve admiration that fails to lead to close and helpful friendships.

Even given the positive association between antisocial behaviors and peer admiration, antisocial behavior can and does coexist with isolation and withdrawal. Indeed, antisocial behavior among isolated or withdrawn children represents a double jeopardy of sorts: various researchers report that more problems arise when aggressive bullies simultaneously occupy the role of aggressor and victim or alienated student (Andreou & Metallidou, 2004; Brockenbrough et al., 2002; Ladd & Burgess, 1999; Troop-Gorden & Asher, 2005). These bullies/victims or aggressive-withdrawn students are more likely to have maladaptive social behaviors and low self-esteem than bullies who were more accepted by and engaged with their peers (Hyman et al., 2006). In addition, aggressive and unpopular boys were more likely to join aggressive groups than nonaggressive or aggressive and popular boys (Farmer et al., 2002).

Thus, the weight of findings on antisocial behavior effects indicates that aggression and other negative social behaviors operate through altering social relationships and social supports, both in positive and negative ways depending on the social context and the social group (e.g., boys versus girls).

Indeed, aggression is negatively associated with a host of contextual and social antecedents, such as parental involvement (but positively associated with parental discipline), religious involvement, nonaggressive classroom peers, and participation in after-school activities (Coley, 1998; French et al., 2008; Goldstein et al., 2001; Lansford et al., 2005; Lord & Mahoney, 2007; McEvoy & Welker, 2000; Morales & Guerra, 2006; Morrison et al., 1998), although influences related to family and personal friendships may matter more than broader contexts, such as the whole school environment (Joussemet et al., 2008; 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 continue to advance research beyond the simple antisocial behavior–education outcome connection.

Prosocial Behaviors. The prosocial behavior findings are much clearer than the findings on antisocial behaviors: All studies involving prosocial behaviors as an outcome or predictor showed positive associations with desired academic and social outcomes such as literacy comprehension, school completion, friendships, peer acceptance, and occupational status. No studies reported negative or nonexistent relationships for prosocial behaviors.

The case for positive relationships between prosocial behaviors and other experiences and outcomes is strengthened by the fact that much of the prosocial behavior research was conducted as part of the studies also examining antisocial behaviors. In nearly every one of these cases, prosocial behaviors had an inverse relationship to causes or outcomes compared with antisocial behaviors. For example, the Miles and Stipek (2006) study cited earlier found that prosocial behavior (offering help, showing empathy) in 1st grade positively influenced literacy skills in 3rd grade, in concert with negative associations between aggression and literacy. Although Wentzel and Caldwell (1997) found that antisocial behavior had inconsistent links with cumulative GPA among sixth graders, prosocial behavior (helping, considerateness, and rule-following) was consistently and strongly related to GPA. Likewise, as described in the antisocial behavior studies, achievement itself can affect prosociality: Chen and colleagues (1997) show that academic achievement in math predicts social competence and peer acceptance.

The reviewed studies also show that prosocial behaviors relate to social supports: prosocial actions are bolstered by teacher positive regard,

reciprocated friendships, religious involvement, and paternal involvement (Barry & Wentzel, 2006; Chang et al., 2004; Chen et al., 1997; French et al., 2008; Wentzel et al., 2004). The prosocial literature, however, has focused more clearly on the ways that prosocial intentions (goals) help produce prosocial behaviors. For example, Wentzel and colleagues (2007) noted that having prosocial goals (e.g., how often a student tried to share with others) positively predicted 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.

Links Between Antisocial/Prosocial Behavior and Other Noncognitive Skills

As indicated, antisocial and prosocial behaviors possess numerous 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 social 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; Burgess et al., 2006; Crick & Dodge, 1994; Dodge, 1986). This perspective accords with ideas developed in the self-regulation and motivation research literature.

Nevertheless, we rarely found research analyzing the links between antisocial or prosocial behaviors and key noncognitive skills like motivation, engagement, and effort in the current review. Researchers were far more likely to examine anti/prosocial behavior 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 past 10 years.

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, whereas 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 among students who are not naturally grouped in classrooms (or even schools) that are the base for peer-nomination methods. Direct observation by researchers may be most appropriate for preschool children and very early elementary grades.

The literature on antisocial and prosocial behavior starts from a position of having consistently demonstrated that these behaviors matter in the achievement of educational outcomes. The conceptual and theoretical challenges of this research are partially grounded in measurement issues,

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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CHAPTER 8

Coping and Resilience

Elizabeth J. Glennie

Introduction

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 and resilience have examined how students respond to stress and succeed in spite of risk factors. Although coping and resilience are related constructs, they are distinct in that coping refers to a wide set of skills and purposeful responses to stress, whereas resilience refers to positive adaptation in response to serious adversity. This review presents the definitions of coping and resilience, the ways in which they have been measured, and their associations with academic outcomes.

Methods

The first task for this review 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 used the construct as a predictor of academic achievement. As in other chapters of this book, student coping and resilience had to be measured at the student level at some point between preschool and grade 12. We excluded studies that focused on parental or educator coping skills. 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. This approach yielded 20 articles for this review,[1] 12 of which focused specifically on coping and 8 of which addressed resilience.

[1] 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.

Given the range of possible stressors, coping skills, and resilient outcomes, much research on these topics has not specifically addressed academic success for children and adolescents. This research synopsis focuses on the use of such skills in school, so search criteria for this chapter limited results to those focusing on the positive outcome of academic success and excluded studies that examined only psychological well-being or avoidance of delinquency.

Coping and Resilience

Coping can be defined as "constantly changing efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of a person" (Lazarus & Folkman, 1984, p. 141). Such demands or stressors range from daily irritations to serious trauma, such as abuse. Coping skills are intentional responses to resolve stress that are distinct from involuntary reactions, such as experiencing an increased heart rate or intrusive thoughts. Coping skills can focus on gaining primary control by altering one's circumstances, or on gaining secondary control, by learning to accept one's circumstances. They can be oriented toward engagement, where the actor directs responses toward the stressor; or disengagement, where the actor directs responses away from the stressor (Compas et al., 2001; Connor-Smith et al., 2000; Folkman, 1982). Primary control could involve getting more information and developing a plan to solve a problem, whereas secondary control could involve thinking about the good things that might come from the stressful event or letting out one's feelings. Asking for help could be an engaged response, whereas avoiding the source of stress is a disengaged response. People can use some of these skills individually, and some, like asking for help or support, require building relationships with others.

Coping skills 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.

Although people purposefully respond to stress, they do not necessarily choose the best responses. They may choose maladaptive strategies, such as concealment, withdrawal, or substance abuse. Although different activities may be more or less effective, different overall types of coping (primary, secondary, engagement, disengagement) are not necessarily better or worse than other types. For example, consider a student who anxiously waits to hear about exam results indicating whether she will be promoted to the next grade. The disengagement response of distraction through exercise or reading might be effective, whereas the disengagement response of skipping school is not.

Resilience can be defined as "a dynamic process encompassing positive adaptation within the context of serious adversity" (Luthar et al., 2000, p. 543). Studies of resilience require making judgments about what constitutes both a serious threat and a successful outcome. Because resilience requires adapting to serious adversity, only people who have experienced such threats can be considered resilient. Studies have examined a range of serious threats including chronic conditions, such as poverty, family illness, or neighborhood violence, and acute stressors, such as an accident or illness. People may experience multiple risk factors. Similarly, successful outcomes have been defined in a range of ways from maintaining psychological well-being, to avoiding delinquency, to achieving social or academic success (Masten, 2001; Masten & Coatsworth, 1998). People can be resilient in one outcome but not in others. For example, someone could avoid delinquency but still may be depressed. Originally, scholars presented resilience as a personality trait, but more recent work describes it as a development process that is not static (Luthar et al., 2000).

Although both coping and resilience focus on responses to stress, these concepts are distinct. Coping involves a set of skills, whereas resilience indicates a successful result of the exercise of those skills (Compas et al., 2001). Not everyone who uses coping skills is resilient. Some attempts to cope are not successful, and if the coping skill does not lead to a good outcome, the person is not resilient. Furthermore, resilience refers to success in response to serious threats rather than minor daily aggravations. For example, a high-achieving student who copes with the demands of taking Advanced Placement biology by studying more is not necessarily resilient. 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 examine the factors that helped them succeed relative to other low-income students.

Measurements of Coping

Table 8-1 shows examples of different types of coping strategies. Most of the studies did not place their discussion within a larger theoretical typology of primary versus secondary or engagement versus disengagement orientations but used checklists of coping strategies. Most of them sampled students within a grade, school, or district. Almost all of the studies reported on here used surveys to solicit student reports of their responses to stress. However, no one

coping strategy or scale predominated in these studies. In fact, each study used a different instrument, including the Adolescent Stress, Stressor, and Coping Measure; the Coping Response Inventory—Youth Form; the Children's Coping Questionnaire; and the Coping Resources Inventory Scales for Educational Enhancement.

Table 8-1. Examples of coping strategies

Classification	Trait or Strategy
Individual coping skills: attitudes	• Self-reliance • Hopefulness • Optimism
Individual coping skills: behavior	• Seeking help • Distracting oneself from the stressor • Relaxing
Relational coping skills	• Positive relationships with parents • Positive relationships with peers
Maladaptive coping skills	• Concealment • Negative attitudes about academic success • Withdrawal • Substance abuse

Individual Coping Skills: 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). Other studies combined different coping attitudes. Hawley and colleagues (2007) used the Adolescent Coping Orientation for Problem Experiences measurement tool, which permitted students to respond to questions about their attitudes using a Likert-type scale in which they reported how frequently they used different strategies in response to feeling tense or facing difficulties. Note that these tensions or difficulties could include school difficulties, family problems, daily aggravations, or illness. People may not use the same coping strategies for each of these problems. On this instrument, positive coping attitudes include self-reliance, optimism, and being humorous. De Anda and colleagues (2000) employed the Adolescent Stress, Stressor, and Coping Measure, in which students could respond to items about how frequently they

used different coping strategies, which authors combined into nine subscales including cognitive control, which authors did not specifically define. They identified coping scales as adaptive or maladaptive based on an 89 percent agreement rate among a panel of independent experts that included faculty members in social work. Table 8-2 reports measures associated with coping and coping resources.

Six studies described factors associated with coping or resilience, but their instruments do not truly measure either. Huan et al. (2006) employed the Life Orientation Test, which 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 me, it will." The optimism scale on the Life Orientation Test does not specifically measure coping skills because these statements of optimism and pessimism are general dispositions rather than deliberate responses to stress. Huan et al. note that the life optimism scale does not directly measure coping but cite other work indicating that optimists differ from pessimists in their coping style, where optimists tend to adopt primary coping and pessimists use more disengagement and avoidance strategies (Scheier et al., 1994). Academic confidence can be a coping resource. Nounopoulos and colleagues (2006) examined the belief that one can do quality work in school. Although academically confident people may do better in school, measures reflect a more general attitude than a deliberate response to stress. In another study, authors created a scale they called a resiliency scale (Jew et al., 1999) that included items such as "No matter what happens in life, I know I will make it." Here, authors selected their items based on input from an expert panel that included psychiatrists, psychologists, and a social worker. However, these items do not measure resilience because resilience requires achieving a successful outcome despite a serious threat, and they measure neither a serious threat nor a successful outcome. Furthermore, these items do not adequately measure coping because they do not include any item about whether the person is responding to stress. The traits they identify may be associated with coping skills, and resilient people may have more of these traits, but authors have not shown that.

Table 8-2. Measures of coping skills

Measure Name	Data Source	Subscales or Components	Intended Population
Adolescent Stress, Stressor, and Coping Measure	Student	Relaxation, distraction, cognitive control, help seeking, affective release, denial, withdrawal, confrontation, aggressive behavior, substance abuse	Adolescents
Survey of Adaptational Tasks of Middle School (SAT-MS)	Student	Substance abuse, peer relationships, conflicts with authorities and older students, academic pressures	Middle school students
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)	Adolescents
Coping Responses Inventory—Youth Form	Student	Take problem-solving action, positive reappraisal, emotional discharge, cognitive avoidance	Adolescents 12–18
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)	Not stated in study
Adolescent Coping Orientation for Problem Experiences (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	Adolescents
Optimism scale from Life Orientation Test	Student	NA	Adolescents, adults
Resiliency scale	Student	Optimism, future orientation, belief in others, independence	9th-grade students

Example Articles	Psychometric Properties
De Anda et al. (2000); instrument from Spielberger et al. (1983); subscales created by author	Number of items not reported. *Internal consistency reliability (a):* .90 (middle school), .76 (10th grade) (Source: De Anda et al., 2000)
Chung et al. (1998); instrument from Elias et al. (1992)	*28 items* total *Internal consistency reliability: (a):* .61 to .93 (across subscales) *Content validity:* Item scenarios derived from a behavior-analytic study on stressful school situations in middle school *Construct validity:* Four subscales derived from factor analysis (Source: Elias et al., 1992)
Chung et al. (1998); instrument from Moos et al. (1984)	*14 items* (from Health and Daily Living—Youth form) *Internal consistency reliability (a):* .48 to .73 *Construct validity:* Four indices derived from factor analysis (Source: Moos et al., 1984)
Crean (2004); instrument from Moos (1990); subscales developed by author	*24 items* (short form), *48 items* (full form) *Internal consistency reliability (a):* .64 to .68 (English) and .62 to .73 (Spanish) (Source: Crean, 2004)
Garber & Little (1999); instrument from Mellor-Crummey et al. (1989)	*30 items* *Internal consistency reliability (a):* .75 (positive coping), .60 (denial) and .86 (negative coping) (Source: Garber & Little, 1999)
Hawley et al. (2007); instrument from Patterson & McCubbin (1987)	*33 items* *Internal consistency reliability (a):* .72 (Source: Hawley et al., 2007)
Huan et al. (2006); instrument from Sheier & Carver (1985)	*8 items* *Internal consistency reliability (a):* .76 (American undergraduates) (Source: Scheier & Carver, 1985) ; .69 (Chinese undergraduates and working adults) (Source: Lai, 1997); .60 (middle school students) (Source: Huan et al., 2006)
Jew et al. (1999); instrument developed by authors	*15 items* (optimism) *10 items* (future orientation) *6 items* (belief in others) *6 items* (independence) *Internal consistency reliability (a):* .82 (optimism), .70 (future orientation), .66 (belief in others), .66 (independence) *Stability/reliability coefficients:* .68 (optimism), .57 (future orientation), .58 (belief in others), .70 (independence) (Source: Jew et al., 1999)

continued

Table 8-2. Measures of coping skills *(continued)*

Measure Name	Data Source	Subscales or Components	Intended Population
Coping skills related to academic difficulties	Student	Help seeking, concealment	Students in grades 3 through 7
Coping Resources Inventory Scales for Educational Enhancement (CRISEE)	Student	Social confidence, behavior control, peer acceptance, academic confidence, family support	Students in grades 3 through 8
Social support coping	Student	Parent support coping, adult support coping	Adolescents

Individual Coping Skills: Behavior

Student surveys of positive coping behavior used similar methods asking students how often they took different actions in response to stress. The most frequently studied positive coping behaviors involved seeking help and getting more information. As noted above, de Anda and colleagues (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 Experiences scale (Hawley et al., 2007) includes items for "seeking professional help" and "seeking spiritual support." Marchand and Skinner (2007) used a 5-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, take problem solving action, from the Coping Responses 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.

Relational Coping Skills

Coping involves interpersonal skills and the development of supportive relationships, such as those with parents, other adults, or peers. The relationships are not in and of themselves coping skills, but someone who

Example Articles	Psychometric Properties
Marchand & Skinner (2007); instrument from Skinner et al. (1998)	*5 items* (help seeking) *9 items* (concealment) *Internal consistency reliability (α):* .72 (help seeking in fall); .79 (help seeking in spring), .82 (concealment in fall), .86 (concealment in spring) (Source: Marchand & Skinner, 2007)
Nounopolis et al. (2006); instrument from Curlette et al. (1993)	*99 items* *Internal consistency reliability (α):* .82 (family support) to .85 (peer acceptance) (Source: McCarthy et al., 2000)
Plybon et al. (2003); instrument from Wills (1986)	*4 items* (parent support coping) *7 items* (adult support coping) *Internal consistency reliability (α):* .78 (parent support coping), .78 (adult support coping)

has strong relationships can draw on them to work with another person to relieve stress by asking for help, seeking reassurances, or diverting attention from a problem. Plybon and colleagues (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. Some of these studies of relationships focus more generally on strong relationships with parents and peers, but the analyses do not include specific information about how the respondent interacts with the parent or peer to resolve stress. Chung and colleagues (1998) had students report the number of supportive relationships they had. Hawley and colleagues (2007) included questions about the frequency of "developing social support" and "investing in close friends" as measures of coping strategies for adolescents. Jew and colleagues (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. Nounopoulos and colleagues (2006) distinguished family support from peer acceptance.

Maladaptive Coping Skills

Not all coping strategies are positive. Maladaptive coping strategies are actions and attitudes that lead to negative academic or social outcomes. Although these responses may not be socially desirable, they are voluntary choices

that people make to respond to stressors. 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 (Crean, 2004; de Anda et al., 2000; Garber & Little, 1999) used Likert-type scales where students could state how often they act in various ways, such as "I make sure no one finds out" or "I plan ways to get back at them." Swanson and colleagues (2003) found that African American males with exaggerated stereotypical ideas about males and race developed reactive coping attitudes and had poorer school performance. Maladaptive coping strategies resemble some of the same patterns as aggressive or antisocial behavior examined elsewhere in this book.

Student Interviews

A few studies used interviews to collect information about student coping. In these studies, authors collected stories about each respondent's experiences in high school. Newman and colleagues (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 out 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.

Measurement of Resilience—Risk Factors, Successful Outcomes, and Protective Factors

Scholars have defined resilience in various ways: achieving better than expected outcomes for at-risk people, positively adapting in response to stress, or recovering well from trauma (Luthar et al., 2000). Studies in this review used the first definition, in which people do better than expected given chronic conditions that put them at risk. Table 8-3 shows the way these studies define risk factors and successful outcomes. Studies of resilience reviewed here focus on statistically defined populations of at-risk students; that is, students in a certain demographic group or scoring below a certain point on a test. 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. These demographics include racial/ethnic minority status, poverty, and sex (Gayles, 2005; Kanevsky et al., 2008; Kenny et al., 2002; Reis et al., 2005; Von Secker, 2004). Even within these demographic groups, authors identify different risk factors. For example, Gayles (2005) states that being male

is a risk factor, whereas Von Secker (2004) states that being female is a risk factor. Another study categorized high-risk students as those with a learning disability (Sorensen et al., 2003). Studies of resilience identified at-risk students by establishing thresholds for at-risk categories and using data to assign students meeting those thresholds to the study sample (Kwok et al., 2007). Family traits, such as poverty (Gayles, 2005; Reis et al., 2005) or having a mother with a serious psychological disorder (Garber & Little, 1999), also constitute risk factors. The school context, such as high poverty or academically struggling schools, contributes to risks (Shin et al., 2007).

This review of noncognitive skills focuses on their influence on school success. Although resilient outcomes may encompass a range of outcomes, the studies of resilience discussed here define success in terms of academic

Table 8-3. Definitions of resilience

Risk Factors	Successful Outcome	Study
• Poverty • Being an African American male	Academic achievement (GPA in top 10 percent of their graduating class)	Gayles, 2005
• Poverty (free/ reduced-price lunch) • English Language Learners	Mathematics achievement (score on California's SAT9 exam)	Kanevsky et al., 2008
• Student in inner-city school, first-generation college attendee	Academic success (GPA)	Kenny et al., 2002
• Below median score on state 1st-grade literacy assessment	Woodcock-Johnson III Broad Reading and Broad Math tests of achievement	Kwok et al., 2007
• Economic disadvantage	Academic achievement (above 90th percentile on academic achievement tests)	Reis et al., 2005
• Urban, ethnic minority	School engagement (General Attitude Toward School subscale of the School Sentiment Index)	Shin et al., 2007
• Designation as learning disabled	Academic achievement (Wechsler Individual Achievement Test)	Sorenson et al., 2003
• Low socioeconomic status, ethnic minority, female	Science achievement on the National Assessment of Educational Progress exam	Von Secker, 2004

achievement, such as grades or scores on standardized exams. Most of these measures of risk factors and successful outcomes are available in school administrative records. These studies of resilience try to identify the mechanisms through which these at-risk students succeeded academically and explored various protective factors. Having identified at-risk students, the authors then employed a retrospective approach and asked questions about students' experiences to determine how the successful at-risk students differ from those who continued to struggle in school.

Protective factors include attitudes toward self and school, relationships with adults, and having a resilient personality. Kwok et al. (2007) note that resilient personality traits include adaptability, agreeableness, and conscientiousness. Table 8-4 presents the measures of protective factors that other researchers could replicate. All but two of the studies of resilience used surveys. One of the other studies used student interviews, and the second one was a case study. The interviews highlight the process of resilience and focused on attitudes about oneself at school that may contribute to resilience, such as belief in oneself (Reis et al., 2005). The case study examined factors such as the student's construction of the meaning of academic achievement (Gayles, 2005).

Table 8-4. Replicable measures of protective factors associated with resilience

Measure Name	Data Source	Subscales or Components	Intended Population
Psychosocial characteristics (Personal Development Survey)	Student survey	Character, academic self-concept, academic self-efficacy, attitude toward school	Elementary school students
Parental Attachment Questionnaire	Student survey	Affective quality of attachment scale, parental fostering of autonomy scale	Adolescents
California Child Q-Set	Teacher survey	Ego-resiliency	Personality inventory for children designed for administration by nonprofessionals
General Attitude Toward School subscale of the School Sentiment Index	Student survey	NA	Kindergarten through grade 12
Attitudes about science	Student survey	NA	Grades 4, 8, and 12

[a] No measure was included in more than one study.

The remaining studies of resilience employed surveys. Table 8-4 presents the ways each of these studies measured protective factors. Some surveys addressed attitudes toward school. One of these studies analyzed items assessing students' feelings about school subjects and attending school (Kanevsky et al., 2008). Shin and colleagues (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 on items that measure students' attitudes about science and their beliefs about their ability to do well in science (Von Secker, 2004). 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.

Another study focused on the protective nature of relationships with adults. Kenny and colleagues (2002) distinguished two aspects of the strength of relationships with each parent using the Affective Quality of Attachment scale, which included items such as "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 such as "My mother respects my privacy."

Example Articles[a]	Psychometric Properties
Kanevsky et al. (2008); instrument developed by authors	*8 items* (character); 7 items (academic self-concept) *9 items* (academic self-efficacy); *9 items* (attitude toward school) *Internal consistency reliability (α):* Ranged from .78 to .82. (Source: Kanevsky et al., 2008)
Kenny et al. (2002); instrument from Kenny (1987)	*26 items* (affective quality of attachment) *4 items* (parental fostering of autonomy) *Internal consistency reliability (α):* .87 (both father scales), .91 (maternal affective quality scale), .94 (maternal fostering autonomy) (Source: Kenny, 1987)
Kwok et al. (2007); instrument from Caspi et al. (1992)	*7 items* *Internal consistency reliability (α):* .85 (Source: Kwok et al., 2007)
Shin et al. (2007); instrument from Frith & Narikawa (1970)	*11 items* *Internal consistency reliability (α):* .72 (Source: Shin et al., 2007)
Von Secker (2004); instrument developed by author	*8 items* (Source: Von Secker, 2004)

One's temperament can also protect from risks. Teachers assessed 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," and three negatively worded ones, such as "rapid mood shifts." The agreeableness scale had nine items, including "is helpful and unselfish"; the conscientiousness scale had eight items, including "does a thorough job" (Kwok et al., 2007).

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

General Methods of These Studies

Researchers have used varied approaches to analyze the influence of coping on academic outcomes and of the protective factors associated with resilience. Table 8-5 categorizes studies according to the students' grade level and the source of information about the construct. It summarizes whether other scholars could reproduce these constructs, whether the study results can be generalized to other populations, and whether 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.

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, in most cases, authors collected data directly from students.

Other scholars can revise or build on the original models or repeat the study using a different sample when data or instruments are available. For one study of coping and one of resilience, both the data and survey are available. One study used data from the 1996 National Assessment of Educational Progress (Von Secker, 2004), and the second study used data from the Promotion of Academic Competence Project (Swanson et al., 2003). In most of the studies of coping, a questionnaire is available, and others could replicate the analysis in other educational settings. In two thirds of the studies of resilience, these studies could not be replicated elsewhere.

The samples from most of these studies do not permit generalization to other populations. Although some studies of coping focused on at-risk students, all of the resilience studies focused on at-risk students because

Table 8-5. Approaches to studies of coping and resilience

	Count of Studies Using This Approach	
Study Approach	**Coping**	**Resilience**
At what grade level is the construct measured?		
Preschool	0	0
Elementary school	2	2
Middle school	5	1
High school	3	4
Multiple	3	1
What is the source of information?		
Student report	12	6
Teacher report	0	1
Parent report	1	0
Researcher observation	0	1
Can the study be replicated?		
Data and survey are available	2	0
Questionnaire is available	11	2
No, neither data nor survey are available	2	4
Is the sample generalizable?		
Sample of convenience (an existing intervention program)	3	3
Students identified as at-risk	2	3
Within school	2	1
Within district or region	5	0
Nationally representative	0	1
What is the method of analysis?		
Case study	0	3
Bivariate	3	0
Multivariate	9	4
Multilevel	1	1
What is the study design?		
Case study	9	4
Bivariate	4	4

resilience is defined as success despite serious risks. Given this focus on at-risk children, researchers chose students who participated in programs designed to help at-risk students. The selected programs in coping studies included Schools of the Future Project (Crean, 2004), a Young Scholars Program (Newman et al., 2000), and a drug prevention program (Plybon et al., 2003). The selected programs in the studies of resilience were a museum-based elementary school program (Kanevsky et al., 2008), a high school–university collaborative program (Kenny et al., 2002), and a hospital-based clinical program for students with learning disabilities (Sorensen et al., 2003). In these studies, students volunteered for the program, and study results may suffer from selection bias because at-risk students who choose to participate in a program may differ from at-risk students who do not. None of these studies addressed selection bias. Thus, these studies do not permit generalizations even to other groups of students who face the same challenges.

Five of the coping studies sampled from schools within a district or region of the United States, and two sampled within a school. One study of resilience sampled within a school. In these studies, the authors included information about the ethnic or poverty composition of the students at this school, and the data indicated that nonparticipants differed from participants. In these cases, we can draw inferences about how these samples might differ from a statewide or national sample. One study of resilience used the National Assessment of Educational Progress, a national assessment of students in 4th, 8th, and 10th grades. Findings from these studies are more generalizable to other populations.

We categorized studies by the method of analysis—whether they use case studies, bivariate analyses, multivariate analysis, or multilevel analyses. We also classified studies by their design; that is, whether they were cross-sectional or whether they followed students over time. Three resiliency studies used a case study approach (Gayles, 2005; Kenny et al., 2002; Reis et al., 2005) in which the investigator provided detailed descriptions of educational processes through open-ended interviews of selected students. No coping studies used a case study approach. Three of the coping 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.

Nine of 13 coping studies and half of the resiliency studies used cross-sectional data in which the authors collected coping or resilience measures at the same time as the academic outcomes. On the cross-sectional studies, we

cannot tell whether a resilient person gets good grades or whether succeeding in school by getting good grades helps people become more resilient. The remaining studies were longitudinal; that is, they collected data over multiple time points, and assessed either the influence of coping skills or protective factors associated with resilience on academic outcomes. Some of the coping studies examined changes in these constructs and outcomes over time (e.g., Chung et al., 1998; Garber & Little, 1999; Sorensen et al., 2003). Some studies of resilience measured the protective factors prior to the measure of academic performance (e.g., Gayles, 2005; Kwok et al., 2007; Reis et al., 2005).

Study Results

As noted above, studies of coping focus on different strategies for responding to stress—some attitudinal, some behavioral, and some maladaptive. Some studies highlighted individual attributes, whereas others addressed social relationships. This section examines the relationships of these skills to academic outcomes, including grades and scores on standardized exams.

Although general positive attitudes may not be direct responses to stress, some studies of the influence of this coping asset on academic outcomes found positive relationships. Jew and colleagues (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). Academic confidence was positively associated with grades (Nounopoulos et al., 2006). However, in a study combining the effects of attitudes, behavior, and social-coping strategies, Hawley and colleagues (2007) found that attitudes did not influence achievement net of social coping strategies and behavior.

Similarly, studies of the influence of positive coping behavior reached different conclusions. Hawley and colleagues (2007) found that actions such as seeking diversions were associated with positive teacher judgments of academic performance for whites; seeking spiritual help was associated with positive teacher judgments 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 actions to solve problems 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). Jew and colleagues (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 and colleagues (2006) did not find that either family or peer support influenced grades, net of feelings of academic confidence, and Chung and colleagues (1998) did not find an association between positive social relationships and academic success during the transition to middle school.

Two studies examined the frequencies students reported using different types of coping strategies. Newman and colleagues (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 and colleagues (2000) found that, overall, students reported a greater reliance on adaptive coping strategies than on maladaptive 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. Students reported that maladaptive coping strategies were less effective responses to school stressors than adaptive strategies were.

Resilience Results

Resilience is defined as attaining successful outcomes despite serious adversity. By definition, the resilient students in these studies had succeeded in school. Of these, three defined risk factors in terms of demographic characteristics. Researchers in the first study defined resilient at-risk students as African American poor students who were in the top 10 percent of their high school (Gayles, 2005). Researchers in the second study identified resilient students as those who were female, an ethnic minority, or poor and who scored well on the National Assessment of Educational Progress science exam (Von Secker, 2004). In the third study, participants in an intervention program who did well

on a math exam were classified as resilient (Kanevsky et al., 2008). In these studies, supportive educational environments and attitudes toward school were protective factors. Thus, the authors concluded that resilience is not a fixed personality trait, but that parents and schools can provide environmental supports that can help at-risk students become more resilient.

Two studies examined the protective factors of personality and psychological adjustment. In a study of 1st-grade students with low literacy skills, those who were better able to react to change subsequently performed better on Woodcock-Johnson reading and math assessments (Kwok et al., 2007). However, Sorensen and colleagues (2003) found that improvements in psychosocial adjustment over time were not correlated with improvement in academic performance for learning-disabled students.

Discussion

Both coping and resilience refer to the interaction between a person and her environment. 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. The studies that did not directly link the coping strategy to a stressor or define a resilient outcome may describe resources or assets that facilitate coping and resilience without specifically measuring coping or resilience.

Most of the studies reviewed here 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 of 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.

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 the skills that were measured. Some studies included only attitudes or actions; some focused exclusively on relationships without accounting for individual behavior. Many instruments ask questions about general feelings of having problems without linking the specific problem to a response. Different responses may be more appropriate for certain kinds of stressors. Future

studies should incorporate these different dimensions of coping skills and link them to clearly defined stressors 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? Some focused on attitudes, relationships, and behavior that were not direct responses to stress. Scholars should distinguish coping assets from coping skills.

Similarly, most of the definitions for resilience used statistical means to identify risk factors. Although members of certain groups may be statistically less likely to succeed in school, not all members of these subgroups are equally at risk. For example, a 1st-grade student scoring just above the median on a standardized test may face as many challenges as one scoring just below the median. Similarly, not everyone at a high-poverty school may be equally at risk. 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 can have the greatest benefit.

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, non-kin adults, and peers are protective factors for resiliency. They are assets that help people use positive coping skills. Someone who has positive relationships with teachers will find it easier to use the coping skill of asking for help in school than someone with poor relationships with teachers. 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, with whom to make friends, 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, they are useful for generating relationships to be tested in larger surveys.

Two of the studies reviewed in this report used teacher and parent observations rather than student reports. Correlations between reports of parents, teachers, and children tend to be of a low magnitude; however, each perspective of a child's stressors and responses may be valid (Grant et al., 2003).

Many of the studies reviewed here used publicly 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 whether 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 the studies reviewed here limited analyses to at-risk children by using samples of students who were already participating in programs for at-risk children. Although these studies permit the examination of responses of at-risk students in detail, their results may not be generalized to another population of at-risk students or to those facing different kinds of risks. This is because their parents chose to enroll students in these programs, and these samples have a selection bias. Because interventions should serve those who need them most, it would be more valuable if studies focusing on at-risk students were designed so that results can be expanded to other at-risk

groups. Randomized control studies of interventions are one method for eliminating selection bias.

Coping and resilience 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 environments can help foster these skills and, thus, are susceptible to interventions. Yet, these studies did not specifically examine interventions or teaching approaches that specifically strengthen coping skills or provide protective factors for resilience. 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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CHAPTER 9

Conclusion

We analyzed more than 200 studies of noncognitive attributes to (1) thoroughly review some of the major noncognitive attributes being studied currently, and (2) describe the emerging field and its challenges. Our hope is that students and researchers interested in noncognitive attributes will benefit from this updated overview of how these are defined and measured and how they relate to important educational outcomes. In this brief conclusion, we review some of our more significant findings. Studies of some attributes, such as motivation and self-efficacy, consistently find associations between these attributes and various academic outcomes. However, for many of these concepts, such as effort, self-regulated learning, and coping, scholars do not have a well-established base of measurement, and, thus, it is difficult to determine how much these matter for academic outcomes. Specific conclusions about research on each area are presented below. We also offer directions for future research in the field.

The evidence on student *motivation* is remarkably consistent: intrinsically motivated students, students with high expectations of success and interest in subject matter or tasks, and students trying to master material (versus trying to show competence) are all more likely to succeed than students with alternate motivations. Motivation is a central factor in producing academic outcomes. In terms of measurement approaches, the primacy of the student-based questionnaire will likely remain unchallenged, although experimental, case study, and other methodologies will continue to play a role in validating and applying the fruits of motivational research. Future advances in this area call for empirical work that can link and consolidate the numerous measurement instruments currently used.

The review of *effort* revealed a construct that is widely used, but without a well-established theoretical framework. By and large, studies relied solely on survey questions, either through students' overall evaluation of their effort or through teachers' and/or researchers' independent evaluation of students' effort. The analytical convenience of exclusive reliance on survey items comes with a price for precision that could be remedied by using multiple indicators

of effort, such as performance-based indicators. Furthermore, because the school day includes a range of contexts (e.g., classrooms, study groups) and a range of tasks (e.g., lecture, labs, tests), researchers should ideally measure the amount of effort expended in specific contexts and on specific tasks. Any limitations on the precise measurement of effort, however, does not obviate the researcher from precise interpretations of analyses that hone in on only a single context or task. For example, the amount of effort on a math quiz should not be used as a proxy for the exertion of effort on that day or even in that particular subject. Questions concerning where and on what the student applied effort should always be kept at the forefront of statistical interpretations and conclusions. To the extent possible, we hope that researchers embrace rather than shy away from the analytical challenges the fluidity of the school day poses. Indeed, this presents a unique opportunity to understand the dynamics of effort and to exploit the variability in contexts and assignments to establish causal linkages where possible. There was scant evidence of this approach in our review, but we anticipate that as interest in increasing student effort grows, as well as interest in student engagement more broadly, advances in methodology will follow.

Numerous measurement approaches are employed by researchers studying *self-regulated learning*. The large number of measures being used makes it difficult to compare results across studies and confounds efforts to further refine a model of self-regulation. Our understanding of self-regulated learning 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. Research on self-regulated learning could be improved by an expansion of studies examining domain-specific models of self-regulation. As with other noncognitive attributes studied here, it may be that self-regulated learning is subject-specific, because of variations in motivation or past experiences with a certain type of task. Future research on self-regulated learning should include more longitudinal studies, especially at the middle and high school levels, to help address causal relationships.

Self-efficacy has been found to be developed through feedback, a determinant of academic performance and importantly, is malleable. Self-efficacy adds unique variance in explaining differences in various academic outcomes, but, in general, the best predictors of *specific* academic performances will be self-efficacy beliefs about those specific academic problems (Pajares, 1996). In terms of measurement, self-efficacy measures presented in this review are numerous. In the reviewed studies, 26 distinct

measures were used. The reviewed studies were predominantly cross-sectional, making causal inferences difficult. Future research should consider some consolidation of these many measurement approaches.

Self-concept has distinct, empirically identified components. One component, often called global self-concept, describes a student's self-beliefs about his or her overall ability in school. A second component of self-concept describes a student's domain-specific feelings of competence in a particular subject matter. Not surprisingly, academic self-concept, be it global or domain-specific, is positively related to important academic outcomes like test scores and grades. But, in terms of the causal ordering of self-concept and achievement and the actual strength of the relationship, the results are not conclusive. Measurement issues in this literature appear fairly uncontroversial. A few instruments are used widely and 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. In terms of understanding the relationship between self-concept and achievement, researchers could improve upon their models through the inclusion of more appropriate control variables.

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. 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.

Many studies *of coping and resilience* limited analyses to at-risk children by using samples of students who were already participating in programs for at-risk children. Although these studies permit the examination of responses of at-risk students in detail, their results may not be generalized to another population of at-risk students or to those facing different kinds of risks.

Because interventions should serve those who need them most, it would be more valuable if studies focusing on at-risk students were designed so that results can be expanded to other at-risk groups. Randomized control studies of interventions are one method for eliminating selection bias. Furthermore, future studies of coping and resilience should specifically examine interventions or teaching approaches that strengthen coping skills or provide protective factors for resilience. These studies could then be used to help develop programs that will help students succeed.

Future Directions

Given the diversity of measurement approaches, samples, and theoretical approaches, no clear and complete picture emerges from our research about the typical contribution noncognitive attributes make to academic outcomes. As we have shown, research suggests that many of these attributes have a positive influence on academic achievement, but we simply need more work, especially related to measurement, before a complete assessment can be offered. What is clear, however, is that a great amount of common ground exists for measurement and even conceptual integration across some constructs (i.e., self-concept and self-efficacy; effort and coping). If study of these attributes moves toward more integration in measurement and theory, then researchers could reassess the consistency of findings again in the near future.

We can report a great deal of consistency across the noncognitive attributes we studied in one respect, their general relationship to academic outcomes appears to be positive (with the exception of antisocial behavior) and fairly well established. Clearly, these attributes do matter for academic outcomes, but how and when they matter is not particularly clear. In short, we found plenty of evidence that noncognitive attributes are related to academic outcomes. For example, 22 of the 28 motivation studies that analyzed the relationship between motivation and achievement or attainment outcomes reviewed showed a positive relationship between motivation (however defined) and academic outcomes, almost always GPA or standardized test scores. Self-regulated learning, especially during the early grades, was consistently linked to academic outcomes, as was academic self-concept. In fact, with the exception of coping, we consistently see these noncognitive attributes being positively related to a series of academic outcomes, most commonly GPA and test scores. Also, across many of the chapters, we saw how important

feedback is as a mechanism for influencing these attributes. In self-concept and self- efficacy development, for example, feedback from significant others, such as teachers, parents, and peers, seems to matter a great deal. Motivation, especially intrinsic motivation, seemed to be linked to feedback as well.

It is in the area of measurement where we see the most need for improvement and future research. Overwhelmingly, researchers across all constructs make use of student reports. Motivation, self-concept, anti- and prosocial behaviors, and coping, for example, are all dominated by questionnaires, and this is likely to remain unchallenged. For some attributes, like self-concept, a self-report is sensible since self-concept is fundamentally a perception. But for many other constructs, researchers should consider approaches that tap actual behaviors, which as any researcher knows often do not correlate perfectly to self-reports. We specifically saw how this problem may manifest itself in the *effort* chapter where the authors reported on a study that empirically showed divergence between self-reports and performance-based measures. Across the attributes, we did notice that direct behavioral observations were used infrequently.

Future research may also consider new approaches to sampling. We would not necessarily call this a shortcoming, but it was clear that across the attributes, samples were generally geographically restricted and were not nationally representative. Of course, achieving a nationally representative sample is difficult to impossible for most researchers, but new national data sets from the US Department of Education do include measures of many of the attributes reviewed here. We would encourage more researchers to explore noncognitive research questions using these data sets. Similarly, we saw many measurement approaches modified over and over again, making it very difficult to do any cross-study or cross-attribute comparisons. Perhaps using standardized and well validated measurement approaches would help remedy that problem. We encourage future researchers to think carefully before modifying measures.

For some attributes, most notably self-concept and resiliency, we had difficulty in determining the causal direction between the attribute and important academic outcomes. Often, this was due to choices researchers made regarding methodological and analytical approaches. We do think that the direction of causality is important to establish, both from theoretical and practical perspectives. We too often saw researchers attempting to address causality with data and analytical approaches that could not speak to causality.

We would encourage future researchers interested in questions of causality to explore the use of different methods that can address this important issue.

The literature on noncognitive skills is lengthy and deep. It shows the importance of key attributes such as motivation and self-regulated learning for educational outcomes. Many measures are well-developed, and methods of studying them are sometimes quite innovative. However, we hope the issues we have highlighted in these chapters help improve studies of noncognitive attributes so that they might continue to improve research and practice.

Reference

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578.

Research Methodology

This book synthesizes information on a set of seven noncognitive skills and traits and assesses the methods used to study them:

1. motivation
2. effort
3. self-regulated learning
4. self-efficacy
5. academic self-concept
6. antisocial and prosocial behavior
7. coping and resilience

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 attributes.

Identifying articles on these noncognitive skills involved conducting a series of searches in Education Resources Information Center 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 book reviews empirical, original, peer-reviewed research that focused on the effect of noncognitive skills on academic success. All searches were limited to publications from 1997 to 2008, with a focus on students in preschool through grade 12. 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 included only 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 pertains 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.

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.

Table A-1. Measures in the article coding template

Measure	Definition	Fixed or Variable
Definitions and relationships to other skills		
Skill	• One of seven defined skills for this research synthesis • Each corresponds to one chapter of this book	Fixed
Definition	• Author(s)'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(s) 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 (e.g., a publicly available data set or a series of interviews)	Variable
Sample	• Identifying characteristics of then 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

(continued)

Table A-1. Measures in the article coding template *(continued)*

Measure	Definition	Fixed or Variable
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 hierarchical linear modeling 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
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 timing of collecting study measures also influences assertions of causality. Cross-sectional studies collect all measures at the same time, whereas 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 presents 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.

About the Authors

Robert N. Bozick, PhD, is a social scientist in the Labor and Population Division at the RAND Corporation in Santa Monica, California, where he studies youth labor markets, inequality in higher education, and the transition to adulthood for low-income youth. Prior to working at RAND, Dr. Bozick was a researcher in the Education Studies Division at RTI International.

Ben W. Dalton, PhD, is an education research analyst at RTI International with expertise in the study of high school students, the high school curriculum, career and technical education, and international assessments of achievement. His research interests include course-taking and curriculum differentiation, racial and ethnic differences in educational outcomes, and the organizational characteristics of schools.

Terri L. Dempsey, MA(Ed), is a research education analyst at RTI International with more than 12 years of research and evaluation experience in a broad array of social science disciplines, including education, public health, and psychology. Ms. Dempsey recently completed a master's degree in Educational Psychology, Measurement, and Evaluation from the University of North Carolina at Chapel Hill, where she specialized in student motivation.

Elizabeth J. Glennie, PhD, is a senior education research analyst at RTI International with more than 11 years of experience in research and evaluation. Much of Dr. Glennie's work has focused on the US educational system, particularly the impact of policies on schools, teachers, and students. For these studies, she has analyzed large national databases and designed and conducted surveys of students and teachers.

Jean M. Lennon, PhD, is a research education analyst at RTI International with 15 years of experience in a broad range of education-related issues and research methodologies. Dr. Lennon is primarily interested in how early childhood experiences, both at home and in various care settings, impact later school outcomes.

Jeffrey A. Rosen, PhD, is an education research analyst at RTI International. Dr. Rosen has research interests in survey methodology and educational policy. His interests in survey methodology include approaches for reducing nonresponse bias in sample surveys. Dr. Rosen's interests in educational policy include student mobility, dropout, and policies for at-risk student populations.

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