Academic Tenacity:

Mindsets and Skills that Promote Long-Term Learning

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Introduction

In a nationwide survey of high school dropouts (Bridgeland, DiIulio, & Morison, 2006), 69% said that school had not motivated or inspired them to work hard. Indeed, many of the students who remain in school are not motivated or inspired either, and the more time students spend in K-12 education the worse it gets (Eccles et al., 1998; Stipek, 2004). This represents a serious loss of human potential, with implications for students' well-being later in life and for our country's future economic growth. What prevents students from working hard in school? Is it something about them or is it something about school? More important, is there a solution to this problem?

Most educational reforms focus on curriculum and pedagogy—*what* material is taught and *how* it is taught. However, curriculum and pedagogy have often been defined in a narrow sense, with an almost exclusive focus on cognitive factors, that is, on the academic content of the material and students' intellectual processing of that material. Research shows that this is insufficient. In our pursuit of educational reform, something essential has been missing: the psychology of the student. Psychological factors--often called *motivational* or *non-cognitive* factors -- can matter even more than cognitive factors for students' academic performance. These may include students' beliefs about themselves, their feelings about school, or their habits of self-control. Indeed, there is a growing recognition in education, psychology, and economics of the importance of non-cognitive factors in achievement both in school and in the labor market

(Duckworth & Seligman, 2005; Dweck, 1999; Heckman, Stixrud, & Urzua, 2006; Steele, Spencer, & Aronson, 2002). There has also been a recognition that these factors offer promising levers for raising the achievement of underprivileged children and, ultimately, closing achievement gaps based on race and income (Heckman et al., 2006). The research we review in this paper shows that educational interventions and initiatives that target these psychological factors can have transformative effects on students' experience and achievement in school, improving core academic outcomes such as GPA and test scores months and even years later.

When we refer to the psychology of the student, what do we mean? We mean that students need to think of themselves and school in certain ways in order to want to learn and in order to learn successfully. We also mean that they are able to regulate themselves in ways that promote learning.

When these non-cognitive factors are in place, students will look (and will be) motivated. In fact, these non-cognitive factors often constitute the greater part of what psychological researchers call "motivation," and fostering these mindsets and self-regulation strategies is what psychological researchers typically mean by "motivating" students. This is quite different from common lay conceptions of motivation in which adults try to motivate students through money and other rewards. The kind of motivation we emphasize is motivation that students carry with them in the form of mindsets and skills, and the kind that educators promote by fostering these mindsets and skills.

Haven't there been attempts in the past to motivate students by promoting positive beliefs? Didn't the self-esteem "movement" of the 1990s try to motivate students by making them feel good about themselves, their abilities, and their prospects of success in school? Yes, but unfortunately for the thousands of students concerned, the self-esteem movement had an

erroneous conception of how to foster motivation. The view was that telling students they were smart or talented would raise their self-esteem and motivate them to do well in school (Baumeister, Campbell, Krueger, & Vohs, 2005). In fact, research has now shown that intuitive and well-intended practices, such as praising students' intelligence or talent (as opposed to their efforts or strategies), often backfire (a topic discussed later). This is why research is so important and why an evidence-based approach to education is so critical at this time. We need to know which mindsets and non-cognitive skills matter and how best to impart them in educational settings.

Can focusing on students' psychology possibly be effective when students come from poor backgrounds, live in communities with many problems and few resources, and go to underfunded, understaffed, and underachieving schools? Shouldn't we put all our resources into enriching homes, communities, and schools? It is undoubtedly important to provide students with the material and human resources, such as a safe learning environment, committed teachers, and a solid curriculum--resources that make their life circumstances more conducive to high achievement and more equitable. However, addressing the psychology of the student is also critical. And, as we will see, this can galvanize students to seize the opportunities for learning that are present in their school environment.

This is because adversities that children experience both in school and outside of it can have effects on their psychology, with consequences for learning. It is these non-cognitive factors that psychological researchers have learned to alter for the better. Therefore, while we attempt to tackle large-scale structural problems, we can directly help students to become more motivated and successful learners. Moreover, with greater awareness of non-cognitive factors,

educators may be able to do relatively small things in classrooms that can make a big difference in their students' learning.

Defining Academic Tenacity

The non-cognitive factors that promote long-term learning and achievement can be brought together under the label "academic tenacity." At its most basic level, academic tenacity is about working hard (and working smart) for a long time. More specifically, academic tenacity is about the mindsets and skills that allow students:

- to look beyond short-term concerns to longer-term or higher-order goals, and
- to withstand challenges and setbacks to persevere toward these goals.

Short-term concerns might involve worries about looking dumb or being excluded in school. They might involve an unwillingness (or inability) to subordinate immediate gratification to longer-term achievements. Any of these factors may make students less engaged with school, less likely to take advantage of opportunities to learn, and less equipped to meet challenges or setbacks.

What do academically tenacious students look like? First, they believe that they belong in school academically and socially. School is part of who they are and is seen as a route to future goals, such as providing for their families or contributing to their community or society. Second, they are engaged in learning, view effort positively, and can forego immediate pleasures for the sake of schoolwork. For example, they seek challenging tasks that will help them learn new things, rather than tasks in their comfort zone that require little effort but provide little opportunity to learn. Third, difficulty, be it intellectual or social, does not derail them. They see a setback as an opportunity for learning or a problem to be solved rather than

as a humiliation, a condemnation of their ability or worth, a symbol of future failures, or a confirmation that they do not belong. This is true at the level of a given task and at the level of their studies in general. Tenacious students know how to remain engaged over the long haul and how to deploy new strategies for moving forward effectively.

As will be seen, students may bring these mindsets and skills with them to school, and we will review research showing that measures of students' mindsets and skills predict their future school performance. These mindsets and skills can also be taught, and we will review interventions that change students' achievement by changing specific mindsets and skills. At the same time, many schools may, advertently or inadvertently, foster certain mindsets or skills, and we will show that the programs and schools that succeed in raising achievement often do so by promoting the very mindsets and skills that contribute to academic tenacity.

We focus on research with adolescents, and particularly with low-income and minority adolescents, but we draw on research featuring other groups, because many of the causes and consequences of academic tenacity apply to all students regardless of their age, ethnicity, gender, or income level.

Measuring Tenacity and Its Effects on Achievement

Although differences in intellectual ability predict differences in students' academic performance, wide variation exists in academic success among students with the same level of ability. Why do some students perform better than others even when they have the same level of ability or past performance? Three decades of psychological research have shown how two students, each with high academic ability, can have markedly different responses to frustration, with one relishing the opportunity to learn

and the other becoming demoralized and giving up (Bandura, 1997; Diener & Dweck 1978). Such responses, in turn, affect students' ability to learn over the long term.

Research shows that non-cognitive variables are critical for sustained levels of academic success. More specifically, these variables include students' beliefs about themselves, their goals in school, their feelings of social belonging, and their self-regulatory skills. All contribute to tenacity and academic performance. In this section, we review measures of these variables, highlighting their relevance to academic tenacity and their ability to predict students' future performance above and beyond their history of achievement. In the next section, we describe interventions designed to affect these sources of tenacity and we examine their effects on academic achievement. As will be seen, although students who are lowest performing or most at risk in school are thought to be the hardest to reach, it is often the lowest achievers who respond most to these psychological interventions. This is because in many cases these non-cognitive factors were holding them back.

Mindsets and Goals

Students' Mindsets About Their Intelligence

One determinant of academic tenacity involves students' beliefs about their academic ability. If students are to invest their effort and energy in school, an important prerequisite is the belief that this effort will pay off. Research shows that students' belief in their ability to learn and perform well in school—their *self-efficacy*—can predict their level of academic performance above and beyond their measured level of ability and prior performance (Bandura, 1997).

However, students' belief in their ability to perform well can be fragile and a

critical question for academic tenacity involves how well students' self-efficacy survives when they confront inevitable challenges and setbacks in school. Are there non-cognitive factors that can help us understand the basis for hardy, resilient self-efficacy?

Research by Dweck and colleagues, featuring ethnically and economically diverse samples, shows that a central factor in this resilience is a student's *mindset about intelligence* (Dweck & Leggett, 1988). Students may view intelligence either as a fixed quantity that they either possesses or do not possess (a "fixed mindset"), or as a malleable quantity that can be increased with effort and learning (a "growth mindset).

Because students with a fixed mindset believe that their intellectual ability is a limited entity, they tend to worry about *proving* it rather than *improving* it (Dweck & Leggett, 1988). They are often full of concerns about their ability, and this can lead, in the face of challenges and setbacks, to destructive thoughts (e.g., "I failed because I'm dumb"), feelings (such as humiliation), and behavior (giving up). By contrast, students with a growth mindset will often perceive the identical challenge or setback in an entirely different light—as an opportunity to learn. As a result, they respond with constructive thoughts (e.g. "Maybe I need to change strategy or try harder"), feelings (such as the excitement of a challenge), and behavior (persistence). This mindset allows students to transcend momentary setbacks to focus on long-term learning.

The importance of mindsets about intelligence for academic tenacity can be seen in correlational and experimental research. Longitudinal correlational research shows that these mindsets predict students' academic performance in real-world settings. Blackwell, Trzesniewski, and Dweck (2007, Study 1), working with low-income African American, Hispanic, and South Asian students in an urban school setting, examined students'

mindsets about intelligence as they made the challenging transition to junior high school (7^{th} grade). Students' mindsets were assessed at the beginning of 7^{th} grade by asking them to agree or disagree with a series of items, such as, " You have a certain amount of intelligence, and you really can't do much to change it." Although students with more of a fixed mindset and students with more of a growth mindset entered junior high school with identical past achievement test scores, their math grades differed by the end of their first term and diverged increasingly over the next two years. Students with a growth mindset showed continuous improvement; those with the fixed mindset did not.

How did this happen? Analyses showed that the students with the growth mindset earned higher grades because they valued learning over looking smart. They saw effort as a virtue, since effort helps to develop ability. And they tended to perceive academic setbacks as a call to increase their effort or to try new strategies. However, students with a fixed mindset were less likely to welcome challenges that could reveal shortcomings. They saw effort in a negative light, because many believed that effort is a factor that indicates low ability rather than a factor needed to *express* or *increase* ability. They also tended to see academic setbacks as evidence that they lacked ability.

Thus a growth mindset about intelligence fosters tenacity--by inspiring students to act on their self-efficacy and allowing self-efficacy to survive in the face of setbacks--while a fixed mindset undermines it. Where do these mindsets come from?

Mueller and Dweck (1998), in six experimental studies with ethnically, racially, and economically diverse 5-th grade students, showed how seemingly subtle aspects of praise can have dramatic effects on students' mindsets and resilience. Praising students

for their ability taught them a fixed mindset and created vulnerability, but praising them for their effort or strategy taught them the growth mindset and fostered resilience.

In this research, after completing a moderately difficult set of problems from a nonverbal IQ test, students were praised for their good performance. The praise either focused on their intelligence ("That's a really high score. You must be smart at these problems.") or on their effort ("That's a really high score. You must have worked hard at these problems.") or did not specify a cause of their success ("That's a really high score."). To see how the feedback affected students' resilience to setbacks, the researchers then had students from all three groups complete a second, very difficult set of problems, on which all students performed poorly. Then all students completed a third set IQ test problems that was moderately difficult like the first set.

You might think that the intelligence praise would create the greatest sense of efficacy. After all, those students were told directly that they were smart. However, compared with the other groups, those who received ability praise endorsed a fixed mindset more and thus became mired in concerns about their ability. For example, they did not want to try hard problems—problems that they could learn from but that posed a risk of failure. They tended to see their failure on the harder problems as meaning that they lacked ability. Moreover, they enjoyed the hard problems less and were less interested in taking practice problems home with them. Finally, their performance on the third set of (easier) IQ problems plummeted. They scored worse on it than they had on the first set.

By contrast, students who received effort praise showed the opposite response to the same setback. Relative to the other two groups, they endorsed a growth mindset about

intelligence and chose to work on hard problems from which they could learn. Even in the face of setbacks, they thought they could improve their performance with continued effort, and consistent with this, they wanted to take practice problems home with them. Strikingly, in contrast to the other two groups, after the setback, their performance rose. They scored better on the third set of IQ test problems than they had on the first set. In short, feedback led to a cascade of motivational outcomes that affected performance on a standard intelligence test.

Studies even find that different brain regions are associated with the two different mindsets. For example, after being given the solution to a test question they had answered incorrectly, students with a growth mindset displayed greater activation of brain regions associated with deep semantic processing. This suggested that they were facing up to their mistake and trying to learn from it. Indeed, activation in this brain region predicted better performance on a later test (Mangels, Butterfield, Lamb, Good, & Dweck, 2006).

Students'Achievement Goals

"Performance" vs. "Learning" Goals. One way mindsets about intelligence contribute to tenacity is by shaping students' core achievement goals. In broad terms, these goals can focus on "performance" (as a way of proving one's ability) or "learning" (as a way of improving one's ability). Students' endorsement of these goals often predicts their academic achievement. This has been found across the ethnic spectrum and among both low-income and high-income students (Cury, Elliot, Da Fonseca, & Moller, 2006; Dweck & Legget, 1988; Midgley & Urdan, 2001; Roeser, Midgley, & Urdan, 1996; Shim, Ryan, & Anderson, 2008; Wolters, 2004). As we have noted, students who

see intelligence as fixed often worry about how much intelligence they actually have. For this reason, they tend to focus on "performance goals"—the goal to perform well and to avoid performing poorly so as to prove their ability to themselves and others. (They also have the goal of exerting as little effort as possible, since they tend to believe that high effort will be seen as a sign of low ability; Blackwell et al., 2007.)

By contrast, students who endorse a growth mindset about intelligence tend to have "learning" or "mastery" goals-- the goal to learn and master challenging academic material. For instance, in the Mueller and Dweck (1998) study of praise described above, students who received intelligence praise were more likely to pursue performance goals (choosing tasks in their comfort zone they could perform well on), whereas students who received effort praise pursued learning goals (choosing challenging tasks they could learn from).

Although performance goals can motivate grades, learning goals promote tenacity. Longitudinal studies find that students who endorse learning goals tend to seek out academic challenges, persist on difficult academic tasks more, and develop their abilities more readily (see Pintrich, 2000; Shim, Ryan, & Anderson, 2008; Witkow & Fuligni, 2007; Wolters, 2004).

Obviously, people can have a mix of motives, some learning oriented, some performance oriented. The latter can include the goal to achieve success (referred to as a performance "approach" goal) and the goal to avoid failure (referred to as a performance "avoidance" goal). The extent to which a learning goal, a performance approach goal, or a performance avoidance goal best serves a person's interests depends on the demands of the task at hand. However, it appears particularly harmful to have a chronic and singular

focus on avoiding failure (Cury et al., 2006; Shim et al., 2008; see also Elliot & Murayama, 2008; Harackiewicz, Butera, Mugny, & Quiamzade, 2007). Students who endorse the goal of avoiding failure prefer easy work that helps them to avoid mistakes and setbacks, but such work may afford few opportunities to learn. In fact, students with this goal may worry about failure to the point that they expend more mental energy on managing appearances than on thinking about their work. These students are more likely to engage in "self-handicapping" (Urdan & Midgley, 2001; see Berglas & Jones, 1978). This is a common strategy that students use to prevent a poor performance from reflecting negatively on their abilities. It is called self-handicapping because students can sabotage their own academic success in the process. For example, they might postpone completing a class assignment until the last minute or stay up late partying the night before an important test. In essence, students purchase self-esteem at the expense of learning. Although they can now blame failure on a factor unrelated to their intelligence, they have typically sacrificed the chance to learn and excel.

Longitudinal research finds that the goal to avoid failure arises, in part, from a fixed mindset about intelligence. Indeed, one study found that the detrimental effect of a fixed mindset on math performance was explained by its tendency to instill in students a focus on avoiding failure rather than learning (Cury, Elliot, Da Fonseca, & Moller, 2006). Experimentally inducing the two different mindsets, moreover, led to the same results: Students led to adopt a fixed mindset focused on avoiding failure, while those led to adopt a growth mindset focused on learning. Ironically, students with a fixed mindset saw their fears confirmed. When later given a test, they performed poorly relative to students who had been led to endorse a growth mindset.

Communal vs. Competitive Classroom Goals

Research also suggests that students are often more motivated and successful when classroom activities involve cooperative rather than competitive or individualistic goals (Johnson & Johnson, 2009; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Roseth, Johnson, & Johnson, 2008; Slavin, 1995). Cooperative goals can foster greater motivation through a number of avenues. For example, students working cooperatively may feel a greater sense of responsibility to try their best because they do not want to let down their group members (Matsui, Kakuyama, & Onglatco, 1987). In contrast, students working in competitive environments may engage in more self-handicapping, withholding effort so that they can attribute failures to a lack of effort rather than to a lack of ability (Midgley & Urdan, 2001). Additionally, since one student's gain is another's loss in competitive environments, students may withhold effort to avoid being stigmatized as a "curve-raiser" or "teacher's pet" (Coleman, 1961). Indeed, research suggests that competitive environments are associated not only with lower achievement but also with less personal liking between students (Roseth et al., 2008).

Competitive and individualistic classroom goal structures may be particularly ill suited to minority students. Minority students are more likely to be reared in cultural contexts that emphasize the importance of *communal* and *cooperative* goals over *individualistic* or *competitive* goals (American Psychological Association, 2003; Tyler, Uqdah, Dillihunt, Beatty-Hazelbaker, Conner, et al., 2008), and research suggests that a mismatch between the goals students encounter in school and the goals they encounter at home may have negative consequences for their motivation and achievement (Bell &

Clark, 1998; Deyhle, 1995; Hollins & Spencer, 1990; Tharp, 1989; Vega, Koury, Zimmerman, Gil, Warheit, 1995).

One study asked African American and White 5th graders to read about several high achieving students who endorsed individualistic, competitive, or communal values (Boykin, Albury, Tyler, Hurley, Bailey, et al., 2005). The individualistic students were described as "enjoying solving problems all on her or his own efforts" and generally preferring situations that provided the opportunity to work independently. The competitive students were described as seeking "the challenge of seeing who is best" and generally preferring to compete with others. The communal students were described as feeling that "it is a good idea for students to help each other learn" and that "they can learn a lot of important things from each other." African American and White students both liked the communal students most, but this preference was much stronger among the African American students. Unlike the White students, the African American students actually disliked the peers who endorsed competitive and individualistic values.

Furthermore, minority students appear to be aware of the mismatch between their own goals and the goals often valued in the classroom. This was explored by another study that asked African American students to rate high-achieving peers who endorsed different goals (Marryshow, Hurley, Allen, Tyler, & Boykin, 2005). The African American students liked the student who endorsed communal values best, but they believed that their teachers would like the students who endorsed individualistic or competitive goals more.

This discontinuity between the goals minority students personally endorse and the goals they see as valued in school could affect their sense of social belonging in the

classroom (discussed in the next section). It could also affect their learning and achievement. Unsurprisingly, students are more engaged when the goals of classroom activities match their own values. For example, research on African American elementary school students found them to be more engaged and successful at academic activities (e.g., remembering readings, learning math and geography) when these activities were structured to involve cooperation with their peers, (or even simply presented as promoting communal goals) than when the same activities were completed individually or presented in competitive terms (e.g., work individually or the best team will win) (Boykin, Lilja, & Tyler, 2004; Dill & Boykin, 2004; Hurley, Boykin, & Allen, 2004).

For instance, Dill & Boykin (2004) asked pairs of 10-11 year old African American students to read a short story together. Each student was then tested individually on his or her recall of the story. For half of the pairs, communal goals for the activity were emphasized (e.g., "It is important that you do everything that you can to help you and your partner to learn the story," and "Your partner is counting on you to do the best you can so that you both can succeed"). For the other half, there was no explicit communal message. Instead, the activity was presented as a contest in which the pair of students would win a prize if their two scores averaged to 75% or more. The students given communal goals remembered significantly more about the story than those given competitive goals. They also remembered more than another group of students who had read the story independently.

The challenge for researchers and educators is to find ways to tap into the motivating effects of social activities and to do so in a manner that is compatible with the goals of all students. For example, Walton and his colleagues have found that even majority group students

show greatly enhanced motivation when they believe they are performing a task together with others. Under these circumstances, they work far longer on the task, are more absorbed in it, and perform better on it (Carr & Walton, 2011; see also Walton & Cohen, 2011; Walton, Cohen, Cwir, & Spencer, 2011). The findings suggest that the feeling of working with others helps students to enjoy, value, and work hard on challenging tasks.

Long-Term Goals. Even when the school environment promotes goals for learning and provides opportunities for cooperation students may still think, "What's the point?" That is, students may not energetically seek to learn or grow their intelligence if they do not see learning as serving a purpose that has meaning to them. Students' higher-order or long-term goals—or *purposes*—can also contribute to their engagement and tenacity (Damon, 2008; McKnight & Kashdan, 2009). Longer-term purposes, even when partially formed or "in progress" can provide a reason for students to adopt leaning goals in school and commit to them (Damon, 2008; Kaplan & Flum, 2009). This is because students who are working with purpose feel as though they are learning in order to become the kind of person they would like to be or in order to contribute something of value to the world beyond themselves. They are not simply memorizing material (they will soon forget) in order to pass a test.

Although no study has examined the many facets of youth purpose at once, many studies have examined sub-components and demonstrated links to academic tenacity. One of these components is a realistic long-term goal. For instance, Oyserman, Gant, and Ager (1994) showed that African American 8th grade students who had begun to consider their positive long-term aims, such as completing college, earned higher grades and state achievement test scores and were rated by teachers as more persistent.

Importantly, this relationship occurred only for students who were aware of what it would take to achieve their long-term goal, suggesting that students need both a sense of purpose and a realistic assessment of how to work toward it. The benefits also appeared strongest for African American males, who are at the greatest risk for disengagement from school.

Not all long-term aims motivate a commitment to school, however. The aims need to be seen as relating to schoolwork. For example, one experiment with high-poverty, primarily African American 7^{h} grade students led half of the students to reflect on a career goal that required high levels of education (medicine, business, law) and the other half to reflect on a career goal that seemingly did not (acting, athletics, music). When teachers handed out an extra-credit assignment, 23% of students who had been led to think about education-relevant careers turned it in, as compared to only 3% of students who had thought about education-irrelevant careers (Destin & Oyserman, 2010).

A long-term aim is also more motivating when students think it is personally attainable—that is, when students believe that "people like me" can achieve it (Lockwood & Kunda, 1997). In one experiment, Destin and Oyserman (2009) told low-income minority middle school students that college completion cost either $30,000 (a relatively low amount) or more than $120,000. Students who heard the latter figure, believing that college was closed off to people like them, reduced how successful they thought they would be in middle school and expressed less interest in homework or studying.

A purpose can also encompass a commitment that transcends the self. This can foster long-term tenacity (Damon, 2008), a point to which we return in our discussion of

schools that foster positive motivational environments (Ryan & Deci, 2000). When high school students reported that they were motivated by a desire to contribute to society, they adopted more learning goals and showed less of a focus on simply avoiding failure (Lee, McInerney, Liem, and Ortiga, 2010). Importantly, similar patterns were *not* found when students were motivated by more self-oriented desires, such as making money or gaining status (cf. Yeager & Bundick, 2009). Similar results were obtained by Anderman and Anderman (1999), who examined the transition from elementary school to middle school among a group of mostly racial minority 6th grade students. This study found that students who were more motivated to have an impact on society also had a stronger desire to learn their course material rather than simply worrying about their ability. The motivation to achieve high status in the future, by contrast, has the opposite effect. It went along with less desire to learn and a greater concern about ability.

Thus, although research on youth purpose is still emerging, it seems that realistic long-term goals, especially when they are viewed as related to schoolwork and as an opportunity to make a difference in the world, can instill tenacity and promote deeper learning.

Social Belonging

In the survey of high school dropouts cited at the outset (Bridgeland et al., 2006), the researchers noted that their participants, while in school, "craved one-on-one attention from their teachers, and when they received it, they remembered it making a difference." In addition, those who participated in focus groups reported that some of their best days in school were days on which their teachers noticed them, got them involved in class, and encouraged them (see also Finn, 1989). In light of this, it is not surprising that an important predictor of academic tenacity

involves students' feelings of social belonging in school, and their perception of the quality of their relationships with other students and with teachers (Goodenow, 1992).

Longitudinal research shows that a sense of social belonging allows students to rise above the concerns of the moment and links social belonging to long-term student motivation and school success (Walton & Cohen, in press). Specifically, adolescents who feel they have better relationships with teachers and peers experience a greater sense of belonging in school. As a result, they are more motivated and engaged in class and earn better grades, effects that hold controlling for their prior levels of motivation and performance (Furrer & Skinner, 2003; Roeser, Midgley, & Urdan, 1996; Wentzel, 1997). Although it did not measure students' sense of belonging directly, a longitudinal study of Italian schoolchildren found that third-graders' prosocial behavior—behaviors that facilitate the development of positive social relationships in school—predicted their grades in 8th grade even better than did their academic performance in 3rd grade (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000).

Self-Regulation and Control

Even if students have the mindsets and goals that encourage tenacity, they may still perform below their potential. A further contributor to academic tenacity and school achievement are self-regulatory skills—skills that allow students to rise above the distractions and temptations of the moment, stay on task, and navigate obstacles to long-term achievement.

Most of us are familiar with the "marshmallow" studies of Walter Mischel and his colleagues (Mischel & Ebbesen, 1970; Mischel, Ebbesen, & Zeiss, 1972). In these studies, preschoolers at the Bing Nursery School at Stanford University were given a

choice between a reward they could get whenever they wanted (e.g., one marshmallow) simply by ringing a bell and summoning the experimenter and a reward they would get if they waited for the experimenter to return on his own (e.g., two marshmallows). Children's responses varied greatly. Some rang the bell only seconds after the experimenter had left the room, while others waited the full time (an interminable 15 minutes). Years later, Mischel and his colleagues located the participants and followed up (Mischel, Shoda, & Rodriguez, 1989). They found a significant positive correlation between children's ability to wait as preschoolers and their SAT scores when they were seniors in high school. The longer students waited for a second marshmallow at age 4, the better their SAT scores.

High levels of academic performance require students to forego activities that may distract or tempt them in the short-term in order to pursue tasks that are important to their long-term academic success. To do well on the next day's math test, a student must study for the test, not play video games. A relatively recent study assessed 8th graders' self-control using a variety of parent-, teacher-, and self-report measures (Duckworth & Seligman, 2005). For instance, parents and homeroom advisors rated students' impulsiveness (e.g., their ability to inhibit behavior and follow rules), students rated their own impulsiveness, and students reported the degree to which they would prefer immediate rewards over larger, later awards. An average of these measures proved highly predictive not only of students' final 8th grade GPA and achievement test scores, but also of whether they were admitted to a selective high school (Duckworth & Seligman, 2005).

In this study, self-control was an even stronger predictor of success than a measure of students' intellectual ability—their IQ score. It predicted final GPA above

and beyond both IQ and first-term GPA. Additional findings suggest why self-control is so important. Self-control but not IQ predicted fewer absences from school, more time spent studying, and less time watching television. In an age in which children encounter more and more distractions, when Facebook, Twitter, and text messages are always available, the ability to turn off distractions to focus on a difficult academic task may become increasingly important for academic success.

Another important factor in academic tenacity is *grit*, or "perseverance and passion for long-term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). Whereas self-control involves the ability to resist temptations and control impulses in the short-term, grit emphasizes perseverance in the pursuit of long-term goals. As Duckworth and colleagues (2009) write, "An individual high in self-control but moderate in grit may, for example, effectively control his or her temper, stick to his or her diet, and resist the urge to surf the Internet at work—yet switch careers annually." Insofar as high levels of achievement require sustained effort on difficult tasks, grit will be an important predictor of remaining in and succeeding in school. Individual differences in grit are measured through people's level of agreement with such statements as "I have achieved a goal that took years of work" (high grit) and "I become interested in new pursuits every few months" (low grit). Although grit is unrelated to IQ, it predicts educational attainment, adolescents' and college students' GPA, retention among military cadets in demanding classes at West Point, and children's performance in the national spelling bee, effects that are a function of their increased study time (Duckworth et al., 2007; Duckworth & Quinn, 2009).

What is the relation between grit and the mindsets and goals discussed earlier? Although no definitive answer is available yet, certain mindsets and goals may contribute to grit. Students who have a growth mindset about intelligence, learning goals, a higher-order purpose, and a sense that they belong in school may well evidence more grit in their academic work.

In summary, academic success requires more than ability. It requires the application of ability and the growth of ability through sustained hard work. Mindsets, goals, and self-regulatory skills—non-cognitive factors that contribute to academic tenacity—play key roles in this enterprise.

Interventions that Change Academic Achievement by Changing Tenacity

The finding that non-cognitive factors consistently predict academic achievement suggests that psychological interventions that target these critical processes could change academic outcomes for the better. The interventions we review in this section target students' psychology--they do not alter the classroom curriculum or teachers' practices. These interventions cultivate a growth mindset in students, buttress the belief that they belong in school, encourage goals that promote challenge-seeking, engagement, and learning, and foster the skills that enable students to pursue these goals tenaciously.

Because these interventions target key psychological concerns, they have several unique characteristics. First, under certain circumstances, they can be fairly brief, yet produce long-term benefits in academic outcomes that persist months and even years later (Blackwell et al., 2007; Cohen, Garcia, Apfel & Master, 2006; Cohen, Garcia, Purdie-Vaugns, Apfel, & Brzustoski, 2009; Walton & Cohen, 2007, 2011). This is because they can trigger enduring changes in the

way students perceive their ongoing school experience. These changes can then feed on themselves to produce compounding benefits.

Second, psychological interventions can work synergistically with other reforms, such as reforms aimed at curriculum or pedagogy. For example, the Concept-Oriented Reading Instruction program, discussed below, underscores how motivational and cognitive interventions may both be necessary for optimal motivation and learning (Guthrie et al., 2004). For example, teaching children new reading strategies, such as organizing a story graphically, had no impact on their motivation and achievement in reading (Guthrie et al., 2004). But, when accompanied with scientifically validated motivational components, student performance rose.

Third, because psychological interventions are carefully crafted to create the maximum psychological impact, researchers and practitioners have to work cooperatively to integrate the interventions into any new school context. They are not one-size-fits-all. Instead, they must be customized for any specific site (see Evans & Clark, 2011; ; Yeager & Walton, 2011).

Mindsets

As we have noted, a critical aspect of academic tenacity is the ability to transcend immediate concerns and respond to academic setbacks with resilience. Students who endorse a fixed mindset about intelligence, as we have seen, tend to be overly focused on short-term concerns about their ability and to view academic setbacks as evidence of a lack of ability. When their ability is threatened or undermined, they often withdraw their effort (e.g., Blackwell et al., 2007; Mueller & Dweck, 1998) and this, not surprisingly,

impairs their academic achievement (e.g., Blackwell et al., 2007; Mueller & Dweck, 1998).

Such findings have impelled researchers to design interventions that change students' mindsets. In one study (Blackwell et al., 2007), minority public school students in New York City participated. These students were making the difficult transition to 7th grade, and many were already showing declining grades, particularly in math. The students were divided into to groups, with each group receiving a 6-session workshop. The control group's workshop focused on study skills, but the growth mindset workshop contained information both about study skills and about the growth mindset. In the growth mindset sections, students learned how the brain grows new connections and "gets smarter" when a student works on challenging tasks, and they learned how to apply this lesson to their schoolwork. The control students showed the continued decline in math grades that often occurs in middle school (Eccles et al., 1998). Learning study skills, even useful ones, did not change students' academic outcomes. But the students exposed to the growth mindset workshop showed a sharp rebound in their math grades. The motivational intervention, it seems, enabled them to put their new study skills into practice.

Qualitative reports from teachers and students illustrate how the intervention had this effect. Teachers, who were unaware of which workshop students were in, were asked to write about any changes in motivation they were seeing in their students. Teachers singled out three times as many students in the growth mindset group than in the control group, saying that they had seen marked changes, as in the following examples: "Your workshop has already had an effect. L, who never puts in any extra effort and often doesn't turn in homework on time,

actually stayed up late working for hours to finish an assignment early so I could review it and give him a chance to revise it. He earned a B+ on the assignment (he had been getting C's and lower)." "M. was [performing] far below grade level. During the past several weeks, she has voluntarily asked for extra help from me during her lunch period in order to improve her test-taking performance. Her grades drastically improved from failing to an 84 her recent exam."

In addition, inner-city students in 20 schools in New York City completed an on-line version of the growth mindset intervention ("Brainology"). They almost unanimously reported increases in their tenacity: "I concentrate better on tests as well as homework. I have also been very responsible, and i know i can do what i put my mind to," "I used to give up easily and now i keep on trying," "I used to be thinking that I was going to fail. I started failing tests. Now i keep passing some tests," "Now, my attitude towards the subjects that I have trouble in [is] I try harder to study and master the skills that I have problems in," "You could be scared sometimes in a school subject but do not give up[,] keep studying and you could find your way throw [through] it."

A number of students also reported that the image of their brain making new connections increased their engagement with learning: "My favorite thing from Brainology is the neurons part where when u learn something there are connections and they keep growing. I always picture them when I'm in school" or "I imagine neurons making connections in my brain and I feel like I am learning something."

Similar results were obtained by Good, Aronson, & Inzlicht (2003) with a largely minority low-income sample of 7th graders. In their study, the students met and emailed with college students, who taught them that intelligence grows with effort and hard work, that the brain can form new neural connections throughout life, and that the mind, like a

muscle, gets stronger with use. Compared to the control group, this intervention produced significant benefits on state-wide achievement tests administered at the end of the year. Indeed, it eliminated the gender gap on math achievement test scores.

Equally promising findings have been obtained with minority and non-minority college students (Aronson, Fried, & Good, 2002). College students in the growth mindset group learned how the brain can grow and change when you stretch yourself to learn new things. In order to solidify the message and make it their own, the students communicated this message, in a pen pal letter, to younger, at-risk pupils. They were told that if the young "students can be convinced that intelligence expands with hard work, they may be more likely to remain in school and put effort into learning." The college students in another group learned that intelligence was composed of many different talents and that "every person has both intellectual strengths and weaknesses." They also wrote letters to younger, at-risk students and were told that if "struggling students can be convinced that there are many different types of intelligence, they may be more likely to continue to learn in an attempt to find and develop areas of strength." A third group served as a no-treatment control group; they wrote no letters.

Only students in the growth mindset group profited from their intervention. Both White and African American students in this group earned higher grade point averages the following academic term. In addition, the African American students in this group reported that they enjoyed and valued schoolwork more than their counterparts in the other groups.

Thus, changing students' mindsets about intelligence can change they way deal with challenges and setbacks in their school environment, making them more tenacious learners and higher achievers.

Social Belonging and Value Affirmation Interventions

As we have noted, an important factor in determining whether students stay engaged and achieve in school is their sense of social belonging—whether they feel included and respected by others in school. In addition to the longitudinal research described above, experimental research shows that even subtle cues that create a sense of social connectedness to others, such as sharing a birthday with someone in your field of study, increase students' motivation for that field (Walton & Cohen, in press). Further, intervention research finds that buttressing students' sense of social belonging in school can lift them out of everyday recurrent worries about their belonging and benefit their academic achievement in the long-term (Walton & Cohen, 2007). These interventions are most effective for students who worry about their belonging in school, such as students from groups that have been negatively stereotyped or historically marginalized in school (Steele et al., 2002).

One study tested an intervention to buttress African American students' sense of social belonging in the transition to college (Walton & Cohen, 2007, 2011). The study exposed first-year college students to information from more senior students indicating that, regardless of ethnicity, most students worried about their social belonging at first but that, over time, these worries dissipated and almost all students came to feel at home (cf. Wilson & Linville, 1982, 1985). Thus, the intervention communicated to students that worries about belonging in college were not specific to them or their racial group. To

reinforce this message and apply it to their own lives, students wrote an essay describing how their own experience reflected the process of change and adjustment they had just learned about. These essays, they were told, would be shared with entering students in subsequent years to help improve their transition to college. Students in the control groups were also exposed to information from more advanced students and also wrote essays, but the content was not relevant to issues of belonging.

The intervention had few effects on European American students. But for African American students, the group negatively stereotyped in school, it had important benefits. Immediately after the intervention, most African American students in the social-belonging group expressed appreciation for the opportunity to participate in the study and reported that they learned important things from it. For instance, they wrote, "I learned that I'm not the only one who feels like they're below par," "I feel like I've gained more reassurance that everyone has their doubts when they first get to [school name] but manage to overcome them," "[The information from senior students] makes my struggle to transition [seem] more normal . . . [makes me feel] less isolated," "I was surprised to find that so many upperclassmen shared the same feelings … it was helpful to have heard them talk about 'bouncing back'."

Even more striking, compared to students in control groups, African American students in the social-belonging group earned better grades over the next 3 years (Walton & Cohen, 2007; 2011). In spite of its brief duration, the intervention reduced the Black-White achievement gap over this 3-year period by 52%. It did so, it seems, by shoring up students' tenacity in the face of adversity. Daily surveys given to student participants reveal that, in the control groups, adversity prompted a drop in academic motivation and

belonging among African Americans, but adversity did not have this effect for African Americans who received the belonging intervention. Moreover, African Americans in the belonging intervention reported that they took greater advantage of opportunities for learning. For example, immediately after the intervention, they reported greater interest in taking difficult highly educational classes and, later, in daily surveys they reported emailing professors with more queries about their courses and studying almost an hour and a half more each day. Preliminary data from a similar intervention with adolescents suggests that it helps buffer them against the difficult transition to middle school.

In other research, Cohen and colleagues have investigated a "values affirmation" intervention (Cohen et al., 2006, 2009), an intervention that reminds students, in the school setting, of the things that they value in themselves. Many students, especially those who face negative stereotypes in school, may not feel that the things they value most—their sense of humor, their relationship with their family—are things that make them valuable in the school setting. By thinking about and elaborating upon the qualities that they most value in themselves, students can "bring" these values into the school setting and thereby enhance their sense of belonging. Indeed, the values affirmation technique has been shown to reduce stress and threat in school settings for students who face negatively stereotypes in school.

In the values affirmation intervention, 7th grade students in an ethnically diverse middle school performed an in-class exercise in which they rank ordered a list of personal values in terms of their importance to them. In the values affirmation group, students then wrote for about 15 minutes about why their top-ranked value, whatever it was, was important to them. Students in the control group wrote about why their low-ranked value

might matter to someone else. Importantly, the intervention was delivered at the beginning of 7th grade, before a cycle of stress and poor performance could take hold.

The values affirmation intervention benefited African American students. It improved their grades during the term in which it was delivered, cutting the percentage of students earning a D or below in the course in which the intervention was delivered from 20%--a rate almost identical to historical norms for the course--to only 9% (Cohen et al., 2006). A few booster exercises reinforced the intervention during the year. During both that year and the following year (the final year of middle school the intervention), the intervention increased African American students' grades in all academic classes, decreased the percentage of these students assigned to remediation, and increased the percentage of them assigned to a more advanced math class (Cohen et al., 2009).

The intervention was found to be most effective for African American students with a history of poor performance, a group often hardest to reach (Ceci & Papierno, 2005; see also Sherman & Hartson, in press). For this group the affirmation prevented poor performance in school from delivering a lasting blow to their sense of belonging in school (Cohen et al., 2009). Like the belonging intervention, the affirmation intervention robbed academic adversity of its power to undermine students' belonging and tenacity (Cohen et al., 2009; Cohen & Garcia, 2008).

Identity and Self-Relevance Interventions

A third class of interventions targets students' beliefs about the relevance of school to themselves, their lives, and their society. . These interventions dovetail with our earlier discussion of how a sense of purpose fuels tenacity. We set the stage here with two short-term experiments and then move on to describe a full intervention.

One strategy links current learning to a social purpose beyond the self. For example, Jang (2008) showed that when college students were told that a relatively uninteresting learning activity (learning about correlation coefficients) would empower them to be better teachers who could improve students' lives, they worked longer on learning the content and, importantly, processed the lesson more deeply than other students who were not given this rationale. That is, although all students memorized the same facts about statistics, only those with a larger purpose came to understand the deep structure of the mathematical concept and were able to apply it later to new problems that they had not seen before. Similarly, Vansteenkiste, Simons, Lens, Sheldon, and Deci (2004) showed that when students were told that learning about recycling could help them improve society (versus save money) they persisted longer in the learning task and performed better on a test of deep conceptual learning.

Hulleman and Harackiewicz (2009) developed an intervention to encourage high-school students to see the relevance of science to their lives. Every 3-4 weeks in a semester-long science course, students were asked to write a brief essay describing how the material they were studying that week in science class could be applied to their lives. Students in the control group simply summarized the week's topic. The intervention was expected to be most effective for students with low expectations of performing well in science, as these students were expected to doubt the value working hard in science. As predicted, among these students, those in the intervention group expressed more interest in science at the end of the academic term and earned higher science grades than control students. The increase in grades for these students represented nearly two-thirds of a letter grade, a striking increase.

Here is an example of how a student in the Hulleman and Harackiewicz study described the relevance of what they were learning that week: "Graphing is an important part of life... For an example, my grandmother and aunt work at a retirement home and they need to decide dosages per day, meals, and etc. Graphing out all the data they have will [help them] come out with a resolution." Interestingly, a gain in grades was seen only when students themselves came up with the reasons why the schoolwork was relevant, and not when teachers simply told students why the material should be relevant to their lives (see Godes, Hulleman, & Harackiewicz, 2007).

Another approach is to target not students' beliefs about the value of schoolwork but their beliefs about their "future self"—who they could become—and ways to become that self. For students who face significant barriers to academic success or who belong to social groups that are associated with poor academic outcomes, exercises that help students imagine themselves being successful in school and that help students specify ways to become this person may be especially effective. One study tested such an intervention among low-income Black and Hispanic 8th graders in an inner city school district (Oyserman, Bybee, & Terry, 2006). Students took part in a ten-session workshop in which, for instance, they described what kind of adult they would like to be, obstacles they would encounter to becoming that person, and how they could overcome these obstacles. As compared to students in a control condition who took standard elective classes, students who were in the workshop had fewer school absences, were less likely to be cited for disruptive behavior, were 60% less likely to repeat 8th grade, and earned significantly higher grades in 9th grade.

Similar findings were obtained in other research in a study of struggling college

students. Those receiving the intervention imagined their desired future selves, wrote about the obstacles that stood in their way, established specific goals to realize this future self, and elaborated on how they could pursue these goals. As compared to students in a control condition, these students' grades rose sharply the next academic semester and they were more likely to maintain a full course load (Morisano, Hirsh, Peterson, Pihl, & Shore, 2010; see also Duckworth, Grant, Loew, Oettingen, & Gollwitzer, in press).

Teaching Self-Regulation

A promising intervention, known as the Student Success Skills Program (Brigman & Webb, 2007), shows how schools can provide supports that cultivate goal-setting and self-management strategies. The intervention focuses on students in various grade levels, ranging from grade 5 to 9, who are struggling in school. All of the participants score below the 50th percentile on their state achievement test in reading or math. There are several components to the program, but the chief ones include teaching children how to set goals and to monitor their progress toward them, and teaching them how to handle high-pressure situations. Rather than focusing on academic content, the program focuses on the skills that help students thrive in challenging situations.

Though the program duration can vary as a function of student needs, it generally totals approximately 12 hours, with weekly sessions throughout the fall term. In small groups, children learn stress-management techniques that they can carry with them into the classroom. These include learning to imagine, in stressful situations, a "safe place where [you] feel protected and in control . . . a caring, supportive, and encouraging place to learn." The students learn how to relax when they face such a stressful situation—by breathing deeply and by imaging their safe place. Like several of the interventions discussed earlier (the growth-mindset intervention, the

belonging intervention, and the values affirmation intervention), such stress-management strategies break the "negative self-talk" that could otherwise distract students from the task at hand and send them on a downward spiral (Brigman & Webb, 2007).

Beyond stress-management, goal-setting and self-regulation are also inculcated in students. For example, on weekly worksheets, students monitor their success at achieving key "life skills," such as social support, nutrition, and fun. Each week, in small supportive groups of peers supervised by an adult leader, the children choose a life skill that they want to improve in the coming week (perhaps creating a growth mindset about their personal qualities). They set a specific goal and a concrete plan to accomplish it. Like a support group, members of the peer group encourage one another, set norms for growth, and pool information on effective strategies. Again, these exercises are reminiscent of the growth mindset, sense of belonging, and values affirmation interventions described earlier: By having children identify areas for growth, create a safe peer group, and reflect on and better fulfill core values, the Student Success Skills program may help students to establish a positive self-identity in school.

The effects of the Student Success Skills program are noteworthy. In randomized experimental trials, children participating in the program earned higher state test scores in reading and math than students in a control group. These gains continued two years after students had completed their participation in the program, and the program helps students across the racial spectrum, including academically at-risk minority students. Moreover, because the program teaches students general life skills, its positive effects should, in principle, generalize to other arenas in their life.

Integrating Curricula with Practices that Promote Academic Tenacity

Although most interventions to increase academic tenacity involve activities that are separate from students' normal classroom experience, such as separate workshops (e.g., Blackwell et al., 2007; Oyserman et al., 2006), in-class exercises (e.g. Cohen et al. 2006, 2009), or out-of-class exercises (e.g., Walton & Cohen, 2007), some research investigates strategies to integrate motivational ingredients into school curricula. For instance Guthrie, Wigfield, and colleagues developed a reading curriculum, Concept Oriented Reading Instruction, that (1) incorporates content that is relevant to students' lives (see Hulleman & Harackiewicz, 2009) (2) fosters student choice (see Cordova & Lepper, 1996), (3) affords opportunities for success to build students' self-efficacy (see Zimmerman et al., 1992), (4) is collaborative to increase social motivations (see Walton & Cohen, 2007), and (5) emphasizes mastery and learning (see Dweck & Legget, 1988). A meta-analysis across 11 studies of 3rd to 5th grade students found that the curriculum significantly increased students' interest in reading and their reading comprehension, as compared to a curriculum with exactly the same content but without these motivational elements (Guthrie, McRae, & Klauda, 2007; see also Guthrie, Wigfield, Barbosa, Perencevich, Taboada, & Davis, 2004; Guthrie, Wigfield, & VonSecker, 2000).

Good Teachers and Schools

Up to this point, we have discussed tenacity as a property of the student, a property that can be measured and instilled through psychological interventions. But tenacity is also a property that can be promoted by teachers and schools, and we hope that, in time, the interventions we have described here will help teachers and schools to do so more successfully. However, it is also important to look at what schools currently do, and to see if the concepts we have

discussed—mindsets, goals, belonging, affirmation, and self-regulation—illuminate the factors that distinguish good schools and good teachers.

They do. Exceptional teachers and schools continually reinforce the message that their students "belong" and have the potential to grow and excel, and they do so in a way that is consistent with the research we have reviewed. In many of these cases, the lessons of the research have trickled down to affect the practices of the educators—through the media, professional schools like schools of education, and collaborations between researchers and practitioners. In still others, the practices of successful educators have "trickled up" to affect the ideas of researchers. But even in these cases, the research has proved critical. It has illuminated the key ingredients of the practice. Sometimes, as we will see, popular conceptions of good practice often overlook or distort key aspects of it. This can lead to disappointing results when the practice is widely implemented without the key ingredients--the psychology--that inspired it. Thus, even when a practice begins with educators, research explicates the key ingredients—the necessary and sufficient conditions—to bring about positive student outcomes.

Below we summarize the properties of teachers and schools that appear to foster student tenacity and performance. We distill their key ingredients into three broad categories: challenge, scaffolding, and belonging. We show how good schools and teachers create challenges and hold students to high standards (promoting a *growth mindset* and *learning goals*), while providing cognitive and motivational support (promoting effective *self-regulation*) to help them reach those standards. Good schools also make students feel connected and supported (promoting a sense of *belonging* and *affirmation*).

We will see that good teachers and schools not only motivate students. They also refrain from commonplace but unwise practices that undermine student motivation, practices that may

lie at the root of the decline in students' motivation to learn that begins in elementary school and accelerates in middle school (Eccles et al., 1998; Gotfried, Fleming, & Gottfired, 2001; Lepper, Sethi, Dialdin, & Drake, 1997; Stipek, 1997; see also Friedel, 2010).

Challenge.

As we have noted, a key component of academic tenacity is seeking and enjoying challenge, and remaining undaunted in the face of it. Effective teachers and schools understand that it is through challenge that students learn and achieve over time.

High standards. Whereas effective teachers and schools challenge their students with high performance standards, less effective ones cater to the presumed limitations of their students by setting low standards. In a study of high school dropouts, many mentioned having felt under-challenged by their school. Over two thirds of them said that they would have worked harder had their teachers demanded more of them (Bridgeland et al., 2006). According to the Department of Education's "What Works" Clearinghouse, "rigor" is one of two school-wide strategies for reducing dropout rates that has received the strongest scientific support (U.S. Department of Education, 2008). (The second, pertinent to a later section on belonging, is a "personalized learning environment.")

Large-scale quantitative studies support the importance of challenge in fostering tenacity. In one large study of students during the transition to middle school, the most consistent predictor of all motivational outcomes, including the desire to learn, was students' perception that their teachers had high expectations of them (Wentzel, 2002). The same relationships held both at a predominantly European American middle school and a predominantly African American one, suggesting that the process generalizes across ethnic groups.

This finding echoes classic research on the self-fulfilling prophecy in the classroom, wherein teachers with high expectations for their students often produce students who ultimately meet those expectations (Rosenthal & Jacobson, 1968; see Jussim & Harber, 2005). In the seminal study, first and second grade students whose teachers expected intellectual growth from them—that is, students who were described to teachers as likely to bloom intellectually in the coming year—earned higher IQ test scores at year's end than students who were not so identified (Rosenthal & Jacobson, 1968). This occurred in spite of the fact that the students identified as bloomers had, in fact, been chosen at random by researchers. Though the study sparked academic debate, the weight of three decades of research confirms the reality of the self-fulfilling prophecy (Jussim & Harber, 2005). Some may disagree about the extent of effects on IQ, but even critics acknowledge the existence of the process and its impact on teacher practice and student learning (Snow, 1995).

Consistent with research on the importance of early intervention (Heckman et al., 2006), the self-fulfilling prophecy occurs most robustly when teachers adopt high expectations for their students early in the school year rather than later, and when the high expectations are introduced in the early years of an academic transition, for instance at the start of elementary or middle school (Raudenbusch, 1984; see Jussim & Harber, 2005, for a review). Earlier we discussed how minority students may be especially uncertain of their belonging in school and thus especially validated by positive messages of growth and belonging from their teachers (Aronson et al., 2002; Walton & Cohen, 2007). Consistent with this, when teachers have optimistic expectations for their students—higher than what may seem warranted by students' prior records—at-risk minority youth especially benefit (Jussim & Harber, 2005).

Why do high expectations promote student motivation? Two mechanisms seem particularly important (Rosenthal, 2002). First, when teachers have high expectations for their students, they invest more attention in them. This can be as subtle as waiting longer for a student to answer a question, or as substantive as providing extra mentoring. Not only does this provide a greater learning opportunity for the student, but it also reinforces the message of growth that psychological research shows to be critical. Additionally, teachers with high expectations for their students express more positive affect toward them, in the form of constructive feedback and encouragement. These factors—attention and positive affect—also exemplify high-functioning classrooms (Hamre & Pianta, 2005; Wentzel, 1998, 2002).

Success stories offer vivid testimony to the power of high expectations in the context of a growth mindset and social support. There are teachers, classrooms, and intervention programs that have, in defiance of the troubling statistics on minority student achievement, dramatically raised the grades, test scores, and college prospects of African American and Latino American youth. Though they differ in many respects and have many components, these diverse success stories share a common emphasis on challenge (Steele, 1997; see also Cohen, Steele, & Ross, 1999).

Jaime Escalante, portrayed both in the movie *Stand and Deliver* and in a book by Mathews (1988), challenged his East Los Angeles Latino students to pass the advanced placement (AP) exam in calculus through a multi-year course sequence. This exam is taken by only 2% of students nationwide, and Escalante's students would have to learn six years of math in only three years. Virtually all of the students came from low-income households; most of their parents had dropped out in grade school (Mathews, 2010). Yet, incredibly, in 1987, Escalante's students accounted for 26% of all Mexican Americans receiving college credit on their AP exam

in the U.S., and the rate at which his students passed the AP exam compared well with many privileged suburban schools (Mathews, 1986, 2010).

St. Mell is an inner city Catholic school in Chicago, with a student body consisting largely of economically disadvantaged African American students. The school imposes high standards, and students receive large quantities of substantive feedback on their written work. They are expected to understand the subject matter at a deep conceptual level rather than at a surface level. Moreover, "The message is everywhere at the school that students can control their own academic destinies . . . that they can achieve in school by working hard" (Pressley, Raphael, DiBella, Gallagher, 2004, p. 225). For the past seven years, 100% of graduating seniors from St. Mell have been accepted to college. Half have attended a top-tier or Ivy League institution.

Xavier University, a small school in Louisiana that enrolls fewer than 4000 students, has similarly impressive track record. Every year since 1993, Xavier has placed more African American students into medical schools than any other institution of higher learning (see Cose, 1997; New Orleans Agenda, 2010). Xavier similarly sets highly demanding standards, with a rigorous curriculum and an intensive college preparation program that begins the summer before freshman year. Xavier's prospective premedical students are inundated with information on careers, especially in science and health, beginning in freshman year. The message is clear: "success is attainable… becoming a physician is not an impossible dream" (Cose, 1997). Epitomizing the growth mindset, Norman Francis, the president of Xavier University, explained his college's educational philosophy eloquently: "From the very beginning, we always believed that every youngster could learn, that the mind was an unlimited facility, that if you gave the support, provided the environment and the teachers, young people would exceed even their own

potential" (quoted in Cose, 1997). Similarly, Dr. Arthur Whimbey, one of the scholars who created the curriculum at Xavier, encapsulated this growth-mindset philosophy in the title of his book, *Intelligence Can Be Taught.*

In contrast, a lack of challenge characterizes less effective schools and teachers. This appears, unfortunately, to be more the rule than the exception. For instance, educators often over-praise mediocre work (Brophy, 1981), especially the work of students from racial minorities (Harber, 2004), in an effort to be encouraging. They refrain—out of discomfort or demands on their time—from providing rigorous critical feedback that specifies strategies for improvement (Cohen & Steele, 1992; Harber, 2004; Stipek, 2001). Echoing the study showing that dropouts bemoaned the lack of challenge in high school, another study found that African American students at an urban school reported receiving the lion's share of the praise from their teacher—more than any other ethnic/racial group—even though they spent the least time on homework and received the lowest grades (Massey et al., 1975). Despite the well-meaning efforts of these educators, over-praising students for mediocre work is not the kind of attention and support that promotes tenacity and learning. More generally, an ethos of low expectations and under-challenge permeates many approaches to the education of at-risk minorities (see Steele, 1997, 1999).

Attention to students' "psychology." Yet, it is not objectively high standards alone that are essential. Echoing a key theme of this report, the high standards must be *perceived* as such by the students--and they must be perceived as attainable.

This is a critical subtlety. Policy-makers and educators often assume that a structural practice or policy change—heightened rigor, small class size, better funding, and so on—will readily translate into positive student outcomes. Though sometimes the case, it is very often not

the case (see Heckman, 1998; Loeb & McEwan, in press). The effects of any educational intervention depend on its psychological meaning to the students (Ross & Nisbett, 1991).

As a consequence, results can hinge on subtle details of implementation. When educators impose challenge or rigor, they must take care to frame it in a way that encourages rather than discourages students. Otherwise, the new rigor may be seen as threatening or overwhelming, and setbacks may be seen by students as confirming their lack of ability. (In the same vein, smaller classrooms and schools are intended to give students more attention and to create a sense of belonging. However, the increased attention, if it occurs at all, may be negative for some students, and a feeling that one does not belong may sometimes be greater in a small pond than it was in a larger pond.) The psychological research discussed earlier underscores the importance of tending to students' perceptions and experiences, and effective educators take pains to do so.

The importance of such considerations is writ large in major academic transitions, such as the transition to middle school or high school. At such times, performance standards rise, and students face an abrupt increase in academic challenge and negative feedback (Dweck, Chiu, & Hong, 1995). And many may see in this difficulty evidence that they do not belong or have the ability to succeed. Indeed, in the first major academic transition, from elementary school to middle school, many students show a sharp decline in motivation and grades (Eccles et al., 1998; Simmons, Black, & Zhou, 1991).

Attention to students' psychology can prove critical during such transitions. It is then that educators must take particular care to encourage optimistic perceptions that can displace the more destructive perceptions students might otherwise have. These optimistic perceptions are encouraged by giving students the message that success is attainable through their own dedication and the available instruction. This is reminiscent of the interventions, discussed

earlier, that taught students a growth mindset and that helped them to see their difficulty as something temporary that they could overcome rather than something permanent and beyond their control. For example, several successful college preparation programs, aimed at academically at-risk minorities, present themselves as “honors” programs (Steele, 1992, 1997; see, for example, Treisman, 1992). Students are invited to participate based on their demonstrated academic potential, and the programs feature more difficult coursework than the standard remedial program. As the programs are honorific, the high standards—and the assurance that students can reach them—are explicit. In such a context, students can readily see their difficulty as a sign of high standards, not limited potential. They can also see success as more validating of their ability to excel than success in the absence of high standards

These programs yield positive results. For example, Treisman’s program—a college calculus workshop—not only boosted minority students’ grades in calculus, but increased their likelihood of graduating from college (Treisman, 1985, 1992; see also Cohen, Steele, & Ross, 2000. More recently, Treisman extended these ideas in creating Academic Youth Development (AYD), a program for students taking 9th grade algebra. AYD selects students at risk for failure in high school algebra to be "student allies" who attend an honorific summer experience during which they learn, among other things, a growth mindset about intelligence. These students are then charged with communicating the ideas to other students in their school. Early evaluations have found it to be highly effective. In one large school district, only 9% of students in AYD repeated Algebra I, whereas many more of the students not in the program (24% to 40%) repeated the course (Charles A Dana Center, 2009).

In summary, demanding a lot of students, done properly, is a way to convey that they have potential. It also conveys the message that greater effort will yield greater competence, the message of malleability shown to enhance motivation and performance in psychological research. Indeed, in meeting the high standards, students can develop a robust sense of their competence, something that does not result from the shallow assurances offered by the self-esteem movement. However, as we have noted, to effectively implement high standards in educational settings requires sensitivity to the psychology of the student and it requires educators who are willing and able to support their students in meeting these higher standards.

Cognitive and motivational scaffolding.

The term scaffolding was introduced in the pioneering work of Jerome Bruner and his colleagues (e.g., Wood, Bruner, & Ross, 1976). In its original usage, it referred to the provision of support, for instance by a tutor to a student, that is "subtle but sufficient"—just enough so that the student can advance, seemingly on his or her own. We will address two forms of scaffolding: the scaffolding of students' cognitive learning and the scaffolding of their motivation to learn. Both kinds of scaffolding contribute to academic tenacity.

Instructional scaffolding is of great importance under conditions of challenge. Students must have the cognitive support they need to reach the high standard. This is why good pedagogy and a solid curriculum are vital (Ravitch, 2010), but pedagogy requires more than the presentation of academic material. Even the simple act of providing substantive feedback, rather than the more commonplace practice of a grade, checkmark, or simple evaluation ("good work"), benefits students' performance and task motivation (see Stipek, 2001, for a review). Research shows that even hand-written comments on report cards, suggesting strategies for improvement, can reduce the likelihood of students' dropping out of school (Mac & Iver, 1990; see Stipek,

2001). High-quality feedback is among the strongest predictors of student accomplishment and teacher effectiveness (Bloom, 1984; Walberg, 1984; Hamre & Pianta, 2005). Part of the effectiveness of such feedback lies in the evidence it provides for the teacher's commitment to learning and belief in the student's capacity for growth.

Many of the success stories discussed earlier use instructional scaffolding to ensure that students reach the higher standard. For example, among St. Mell's practices is the use of intensive review sessions before exams. There are often quizzes before the actual exams, with the quizzes containing questions similar to those on the exams. Students can review their previous quizzes and the feedback they received on them to prepare for exams. Students are also sometimes permitted to take and retake tests until they achieve mastery. This process—quiz, exam, quiz, exam, with difficult conceptual questions visited and revisited—tells students that *learning* is what is valued and helps to ensure their growth.

Studies of expert tutors provide a similar illustration of cognitive scaffolding. These are tutors nominated as highly effective by schools and tutoring agencies. These expert tutors seldom give direct answers and feedback (Lepper & Woolverton, 2001). Instead, they use hints, often providing incrementally more specific hints until the child answers a question correctly. Expert tutors also use questions rather than instructions (e.g., "Why did you borrow a 2 rather than 1?"). Remarkably, over 90% of the utterances of the best tutors are questions, and these questions gently prod the student to greater understanding. To an outside observer, such tutors can seem inefficient. Often they get through fewer problems than less adept tutors. But they produce better results than almost any other educational intervention. With a single tutoring session, they can produce remarkable gains in student achievement of two standard deviations, even with children with a history of failure (see Bloom, 1984; Lepper & Woolverton, 2001).

Expert tutors, like effective teachers (Hamre & Pianta, 2005), continually try to take the perspective of their student. They personalize their feedback and hints, and address their questions to the child's conceptual gaps and motivational needs. These subtle interpersonal dynamics of the teacher-student interaction can contribute heavily to student tenacity. They must be considered in addition to the structural indicators of classroom quality, such as class size and teacher-student ratio, that have thus far predominated in educational debates (Hamre & Pianta, 2005).

Feedback, hints, clever strategies to facilitate student understanding, and targeted questions are among the most important tools at a teacher's disposal. From the perspective of psychological research, these tools enable students to witness, first hand, their agency in their own intellectual growth. They see direct evidence of the malleable nature of ability and the role of effort and strategy in learning.

Motivational scaffolding refers to the supports that educators can use to promote the motivational tools students need to meet challenges in the classroom and beyond. Such motivational tools include (a) goal-setting and self-management strategies, and (b) healthy motivational orientations.

An example of motivational scaffolding supporting goal-setting and self-management strategies can be found in the research by Dominique Morisano and her colleagues discussed earlier (Morisano et al., 2010). Their study showed that a goal-setting regimen helped college students earn better grades and stay in school. St. Mell, the inner city Chicago school described earlier, trains students in goal-setting strategies. For example, students are encouraged to jot down specific, concrete goals through the use of planning books (Pressley et al., 2004). These practices resonate with classic self-efficacy research showing that the simple act of breaking

long-term lofty goals into concrete and short-term goals promotes student learning and motivation (Bandura & Schunk, 1981). Above, we also reviewed the Student Success Skills Program (Brigman & Webb, 2007) that promoted not only goal-setting and self-management strategies but also strategies for coping with stress.

Scaffolding healthy motivational orientations

School environments can also support the development of healthy motivational orientations. They can inculcate a love of learning and a willingness to face failure in pursuit of the goal of intellectual growth—motives that the psychological research has shown are central to tenacity.

Supporting student autonomy. Self-determination theorists have examined the conditions under which students' "intrinsic" motivation to learn is maximized (Ryan & Deci, 2000). Their research has generally focused on how school environments can impede students' intrinsic motivation by undermining their sense of autonomy, and they have shown how even small environmental cues can have large effects. For example, studies show that positive feedback about performance ("You did well") can improve student motivation, but adding a tone of control ("You did well, as you should") undermines it (Deci, Koestner, & Ryan, 1999). Even small, instructionally irrelevant choices can be motivating if they support student autonomy. For instance, in a space-fantasy math-education computer game, simply allowing students to choose their own icon and assign a name of their choice to their spaceship improved their motivation and learning—even when measured a week later (Cordova & Lepper, 1996). A field experiment, featuring high school students being taught a new exercise (Tai-bo) in their physical education class, similarly suggested the importance of nurturing student autonomy. When the new exercise was presented in less controlling terms, simply through differences in wording (e.g. "You *might*

decide to learn more" vs. "You *should* decide to learn more"), students learned the exercises better and were more likely to volunteer to demonstrate them to an audience several days later (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Similar findings have been obtained in more academic content areas as well (Vansteenkiste et al., 2004; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Ryan & Deci, 2000).

Studies also find that teachers sometimes unnecessarily constrain student autonomy, as when they give continual commands, provide solutions before the student has had an opportunity to solve a problem independently, limit choices for reading and writing exercises, and dispense unnecessary incentives like gold stars, rewards, and bribes for good work (e.g. "If you do your work, you'll have extra time for recess") (Radel, 2010; Stipek, 2001). Importantly, autonomy-supportive classrooms are not laissez-faire (cf. Lewin, Lippitt, & White, 1938). They structure activities in a way that advances concrete goals for learning, but that simultaneously encourage students to see themselves as agents in their own growth.

Supporting intrinsic motivation. Earlier we discussed the role of learning goals and a sense of purpose in student tenacity. Consistent with these lessons, high-functioning classrooms support learning for intrinsic reasons rather than extrinsic ones. When students have intrinsic motives, they undertake tasks for their own sake, for the learning, or for goals with intrinsic content, such as growth, community, and health. By contrast, when students have extrinsic motives, they undertake tasks in order to achieve an extrinsic end, such as money or fame. Are extrinsic rewards ever warranted? Gold stars, prizes, and other extrinsic rewards may have their place. For instance, they can serve as a last resort to jump-start a desired behavior, or as a symbol of competence and belonging (Deci et al., 1999). But educators should use them judiciously, as they can easily eclipse the intrinsic reasons for a behavior (Lepper et al., 1997).

In the midst of efforts to raise student performance through economic incentives (Fryer, 2010), it is revealing that many studies demonstrate how student tenacity is fueled more by intrinsic goals than by extrinsic ones (see also Pink, 2009).

For example, in the physical education study described earlier (Vansteenkiste et al., 2004), students displayed better motivation and learning when the new exercise was presented for its intrinsic value ("This is useful for the goal of physical health") than for its extrinsic value ("This is useful for the goal of appearing physically attractive"). Likewise, even marketing students, who might be expected to be relatively more economically motivated, showed greater engagement and learning of new material when it was presented for its intrinsic value ("This will help your personal development") than for its extrinsic value ("This will increase your chances of getting a well-paid job") (Vansteenkiste et al., 2004). These findings dovetail with research showing that, in various domains, persuasive appeals based on compassion and social purpose can often work better than appeals based on advancing personal gain (see Grant, 2008).

As Vansteenkiste and colleagues assert, "If instructors help students see the long-term relevance [of an activity] to themselves in terms of intrinsic goals such as personal growth, meaningful relationships with others, becoming more healthy and fit, or contributing to their community . . . the students are likely to become more engaged with the learning activities and in turn to understand the material more fully and to perform better in demonstrating their competence" (Vanteenkiste, Lens, & Deci, 2006, p. 28).

Motivational messages can be subtle. A lesson of these studies—and a motif in this report—is that seemingly small cues can support or thwart healthy motivational orientations. Even well-intentioned practices can have negative consequences. Praising intelligence, or providing a lot of positive feedback, even for intellectually irrelevant behaviors like good

behavior, may seem like good ways to foster healthy motivation. But they can send counterproductive messages, such as "Intelligence (not perseverance) is what matters most for success" and "Positive feedback is just a sign that the teacher likes you" (Mueller & Dweck, 1998; Dweck, Davidson, Nelson, & Enna, 1978). Likewise, institutional practices, such as public honor roles for grades, separate report card grades for achievement and effort, may arise from good intentions, but they can signal to students that performance is valued more than learning (Soeser, Midgley, & Urdan, 1996).

There are other ways in which schools and teachers can have powerful effects on student motivation, even when these effects are unintended. Students are sensitive to the motives of their teachers, and as a result, they may internalize their teachers' goals as their own (see Fitzsimons & Bargh, 2004). For instance, students displayed greater interest and intrinsic motivation for a new sport when they learned it from an instructor who they believed was instrinsically motivated (an excited volunteer) rather than extrinsically motivated (a paid professional) (Racel, Sarrazin, Legrain, & Wild, 2010). This occurred in spite of the fact that the behavior of the instructor was entirely scripted and held constant across the two groups of students. Moreover, these motivational effects spread like a contagion. Students who had experienced an intrinsically motivated instructor used more "autonomy-supportive" teaching styles when they later taught the sport to a new group of students. As a consequence, these "second-generation" students were more intrinsically motivated themselves. This study suggests that motivational orientations, once started, can spread through an entire classroom, perhaps creating a climate of healthy intrinsic motivation or less healthy extrinsic motivation. More speculatively, the study also suggests that current reforms to impose salient extrinsic pressures

on teachers, in the form of incentives, threats, surveillance, and accountability, may have unforeseen consequences for all actors in the drama—not just for teachers but for their students.

Consistent with the social transmission of motivations, several studies demonstrate a robust correlation between students' perceptions of the motivational orientations of educators and students' own motivation. In a large-scale study in two metropolitan working-class school districts, middle-school students who felt that their school emphasized learning goals (i.e., who believed that their teachers emphasized effort and understanding) were, in turn, more likely to espouse learning goals themselves. They also felt more efficacious about their ability to succeed in school, which, in turn, predicted improvement in GPA (Roeser, Midgley, & Urdan, 1996). Likewise, another large-scale study, focused on four ethnically and economically diverse school districts in the Midwest, demonstrated how the school climate can shape student goals for good and for ill (Friedel, Cortina, Turner, & Midgley, 2010). During the school year, both 6th and 7th graders steadily dropped in the belief that their teachers endorsed learning or mastery goals. Over the same period, their own learning goals similarly deteriorated. However, if students entered 7th grade with a teacher who espoused learning goals, they were buffered against some of the corrosive effects of middle school: "As late as seventh grade, teachers can substantially influence the efficacy beliefs of their students simply by placing emphasis on learning and improving understanding …" (Friedel et al., 2010, p. 110).

The research described in this section shows that the messages educators send to students as they give them feedback, try to motivate their learning, or simply convey their own beliefs and values can shape students' motivation, making them more or less tenacious learners.

Belonging.

Beyond challenge and scaffolding, a final attribute characterizes learning environments that promote student tenacity. They cultivate in students a sense of belonging—a sense of fellowship with peers and teachers. Earlier we discussed how a sense of belonging in school contributes to student tenacity.

A large body of evidence points to the role of a sense of belonging in school as critical to student functioning in general, but as especially important for students in middle and high school. With the transition to adolescence, students too often take a negative turn (Eccles et al., 1998; Simmons et al., 1991). Poor performance can beget worsening performance in a downward spiral, increasing the risk of withdrawal from school, grade retention, disciplinary infractions, and health-risk behavior (Cohen et al., 2009; Resnick et al., 1997). Unfortunately, just as adolescents face these new challenges and have a greater need for positive relationships with adults, the school structure changes in ways that undermine their opportunities for connectedness. There is greater competitiveness with peers. There is more anonymity as students move from class to class, with different teachers and sometime with different groups of students throughout the day. There is more invidious social comparison and social judgment among peers (Wentzel, 1998; see also Eccles et al., 1998; Stipek, 2001). Such practices can also worsen the mismatch—discussed earlier—that many minority students perceive between the cooperative values they may encounter in their home and the competitive values they see at school. Perhaps it is not coincidental that beginning in middle school, minority students show a sharp rise in disciplinary problems and risk behavior (see Simmons et al., 1991).

Earlier we described how students' sense of belonging predicts their academic success. Belonging, in fact, is one of the things that schools can provide that can improve the lives of their students across a host of outcomes. In a large study of over 12,000 adolescents from a nationally

representative sample, “school connectedness” emerged as one of the two most consistent and powerful protective factors against every measured form of adolescent risk and distress (Resnick et al., 1997). (The other factor was “family connectedness.”) This relationship was found even after controlling for demographic variables such as sex, ethnicity, family structure, and poverty. The subjective sense of belonging surpassed the effect of a number of objective factors typically associated with being at risk, such as low GPA, being retained in grade, and parental absence.

One review suggested that an ethos of care and personal concern distinguishes effective from ineffective school programs. “In their responsiveness and willingness to hang [in there] effective programs are more like families than bureaucracies” (Schorr, 1994, p. 231). The survey of high school dropouts discussed previously reminds us that students crave one-on-one attention from their teachers, with many of these dropouts remarking that some of their best days in school were those in which they felt a connection with their teachers (Bridgeland et al., 2006). Many also wished that more had been demanded of them. Being held to high standards and being given the attention and scaffolding needed to reach those standards, sends the message of personal concern (Cohen & Steele, 2002; Wentzel, 2002). In a sense, good teachers are like good parents—at times authoritative but consistently caring (see Wentzel, 2002).

Indeed, the willingness of educators to connect with the lives of students outside of school appears important to the success of several academic interventions (Schorr, 1997). They can do so even through simple exercises. Reminiscent of the affirmation intervention discussed earlier, some teachers have found that expressive writing, in which underprivileged children relate their life troubles to social values and literary stories can have dramatic positive effects on their engagement with school (Freedom Writers and Gruwell, 1999). Ethnographic research suggests that the higher scores of Japanese children in science and math may stem, in part, from

the early emphasis on promoting caring relationships between teachers and students (Lewis, 1995). Students come to see school as place that has their best interests at heart (see also Hamre & Pianta, 2005). Similarly, expert tutors, in contrast to less effective tutors, actively promote warmth and rapport with students, especially students with a history of failure. For example, they are more likely to begin the tutoring session by inquiring about the student's hobbies, friends, and families (Lepper & Woolverton, 2001). From an outsider's perspective, such time on nonacademic material can seem wasteful. But it establishes an emotional safety zone that helps the student to confront cognitive challenge without defensiveness.

These qualitative observations are buttressed by quantitative studies. The perception that teachers care about their students is among the strongest predictors of student performance. Indeed, in one study of first-year middle school students, the degree to which students perceived that their teachers cared about them and their learning constituted one of the strongest predictors of their interest in school and in their coursework (Wentzel, 1998). These factors, in turn, predicted higher GPA. Students are more likely to embrace the norms of their school when they feel that teachers are "on their side" and responsive to their needs (Wentzel, 1998; see also Tyler, 2004). Finally, opportunities for high-risk youth to form caring relationships with peers, teachers, and role models in extracurricular programs predict dramatically reduced rates of high school dropout and criminal arrest (Mahoney, 2000).

Educational environments that promote belonging often harness small groups or "communities of learners" within the classroom (Brown & Campione, 1994). Such approaches have their roots in the seminal work of the social psychologist Kurt Lewin (1951), who recognized and exploited the power of the small group as a vehicle for individual growth. The power of the small group in promoting student learning lies at the heart of various educational

approaches with impressive track records. These include Elliot Aronson's Jigsaw Classroom (Aronson & Patnoe, 1997), Uri Treisman's calculus workshops discussed previously (Treisman, 1992), Elizabeth Cohen's Complex Instruction (Cohen, 1997), and the Interactive Engagement methods that increasingly characterize science education (Hake, in press).

As one example, the Interactive Engagement approach, informed by psychological research, uses lectures interspersed with conceptual questions. Students reflect on these questions and then discuss them in a group of peers until they arrive at consensus for the correct answer. Students (and the instructor) also receive immediate feedback on their level of understanding. This method, with its emphasis on group work and hands-on learning, consistently outperforms traditional methods of science education. Careful studies, using standardized tests of conceptual mastery of scientific concepts, show that students taught with this method make almost twice the gain in conceptual knowledge that students taught with traditional methods do (Hake, in press).

At their best, all of these methods focus small groups of peers on a joint problem and then structure the group dynamic in a way that encourages cooperation. Each group member enacts competence and contributes to the group. By discussing the material, students also learn it at a deeper conceptual level than they do in traditional classrooms

Beyond their instructional benefits, group learning also has motivational benefits. It helps students to see that their difficulties with the course material are often shared, breaking the sometimes debilitating worry that one's frustrations with the new material are unique to oneself. Groups also provide a social identity around course work, which itself can be motivationally

galvanizing (Lewin, 1951). We saw earlier how important it was for students to have an academic identity and for students, particularly from certain groups, to have communal goals.

Anecdotally, many successful educators of underprivileged students exploit the power of group dynamics and identity. Students learn not only that they will reach a higher standard but that they will also help their classmates as a group to do so (Mathews, 1988; Pressley, 2004). For example, KIPP (Knowledge is Power Program), a promising program serving under-privileged students, sets high standards through a rigorous college-preparation curriculum. Students spend 60% more time in the classroom than their peers in neighborhood schools, attending class on Saturdays and for parts of the summer. However, the program also creates a strong culture of teacher and student support, and sacrifice for the common good. A motto at KIPP is "team beats individual"(see Mathews, 2009). Indeed, students adopt a social identity as "KIPPster" (see Deutschmann, 2010; http://www.kipp.org/students/being-a-kippster).

In summary, a rigorous, supportive learning environment characterizes schools that promote student tenacity. This lesson accords with the National Research Council's (2004) and Department of Education's (2008) assertion "student outcomes were most improved when a caring and supportive environment was combined with 'academic press,' or a focus on learning and high expectations for student achievement" (What Works Clearinghouse, 2008). Although the concrete pedagogies and curricula that best serve students vary greatly, at every level educators can promote tenacity by sending the message, in word and deed, that their students truly belong and have great potential.

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Table 1

Selected Interventions With Academic Outcomes

Authors	**Research Participants**	**Effects** (relative to control group)
Teaching Students That Intelligence Can Be Developed (A Growth Mindset)		
Blackwell, Trzesniewski & Dweck, 2007	Urban, low-income, Black and Latino 7th grade students	Higher math grades
Good, Aronson & Inzlicht, 2003	Black and Latino middle school students at a rural school	Higher state test scores for everyone in reading and for girls in math
Aronson, Fried, & Good, 2002	Black and White College Students	Higher GPA; Greater valuing and enjoyment of academics
Helping Students To Feel That They Belong Or Are Valued In School		
Walton & Cohen, 2007; in press	Black college students	Higher GPA
Cohen et al., 2006; 2009	Black and White middle school students	Higher grades among Black students in the targeted class
Helping Students To See How The Curriculum Is Relevant To Their Own Lives		
Hulleman & Harackiewcz, 2009	White, Black, Latino, and Asian high school students	Higher grades in the targeted class among students with low initial expectations of success
Helping Students To Set Goals, Identify Obstacles, And Learn Self-Control Strategies		
Oyserman, Bybee & Terry, 2006	Black and Latino middle school students	Higher grades; fewer absences; fewer disciplinary referrals
Brigman & Webb, 2007	Students in grades 5-9 below 50th percentile in state test math scores	Higher state test scores in reading and math

Note: All interventions were randomized controlled trials.