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Academic Tenacity

Mindsets and Skills that Promote Long-Term Learning

Carol S. Dweck | Gregory M. Walton | Geoffrey L. Cohen

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Introduction

In a nationwide survey of high school dropouts, 69 percent said that school had not motivated or inspired them to work hard.[1] In fact, 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.[2] This lack of motivation to do well in school 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 narrowly defined as the academic content 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. Educators, psychologists, and even economists recognize the importance of non-cognitive factors in achievement both in school and in the labor market.[3] These factors also offer promising levers for raising the achievement of underprivileged children and, ultimately, closing achievement gaps based on race and income.[4] The research reviewed in this paper shows that educational interventions and initiatives that target these psychological factors can transform students' experience and achievement in school, improving core academic outcomes such as GPA and test scores months and even years later.

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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 be—motivated. In fact, these non-cognitive factors constitute 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 than adults trying to motivate students through money and other rewards. Rather, we emphasize the type of 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.

Past attempts to motivate students by promoting positive beliefs have included the self-esteem movement of the 1990s, which tried to motivate students by making them feel good about themselves, their abilities, and their prospects of success in school. Unfortunately, the self-esteem movement had the erroneous view that telling students they were smart or talented would raise their self-esteem and motivate them to do well in school.[5] In fact, research has now shown that 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. 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 be effective even 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 of our resources into enriching homes, communities, and schools? It is undoubtedly important to provide students with material and human resources, such as a safe learning environment, committed and effective teachers, and a solid curriculum. However, addressing the psychology of the student is also critical and can galvanize students to seize the opportunities for learning that exist in their school environment.

The adversity that children experience both in and out of school can affect their psychology, with consequences for learning. So while we continue to tackle large-scale problems in our educational system, 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 the classroom 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
- 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 put off immediate gratification in favor of 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 does academic tenacity look like? Academically tenacious students exhibit the following characteristics and behaviors:

- 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.
- 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 also provide little opportunity to learn.
- They are not derailed by difficulty, be it intellectual or social. 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 in the case of a specific assignment as well as with their studies in general.
- They know how to remain engaged over the long haul and how to deploy new strategies for moving forward effectively.

Some students bring these mindsets and skills with them to school, but these mindsets and skills can also be taught. We will review research showing that measures of students' mindsets and skills predict their future school performance, and we will review interventions that improve students' achievement by changing specific mindsets and skills.

Key Characteristics and Behaviors of Academically Tenacious Students

- Belong academically and socially
- See school as relevant to their future
- Work hard and can postpone immediate pleasures
- Not derailed by intellectual or social difficulties
- Seek out challenges
- Remain engaged over the long haul

We focus on research with adolescents, and particularly with low-income and minority adolescents, but we also 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

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 with equal academic abilities can respond in remarkably different ways to frustration, with one relishing the opportunity to learn and the other becoming demoralized and giving up.[6] Such responses, in turn, affect students' ability to learn over the long term.

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Research shows that non-cognitive factors are critical for ongoing academic success. These factors include students' beliefs about themselves, their goals in school, their feelings of social belonging, and their self-regulatory skills. In this section, we review measures of these factors, 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 positively affect these sources of tenacity and examine their effects on academic achievement. We will show that even though the lowest-performing and most at-risk students are thought to be the hardest to reach, it is often these low 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

Students' beliefs about their academic ability influence their academic tenacity. If students are going to invest their effort and energy in school, it is important that they first believe the 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.[7] Students' belief in their ability to be successful in school can be fragile, however, and a critical question for academic tenacity is how well students' self-efficacy survives when they confront inevitable challenges in school. Are there non-cognitive factors that can help us understand the basis for hardy, resilient self-efficacy?

Stanford University psychology professor Carol Dweck and colleagues have conducted research, featuring ethnically and economically diverse students, that shows that a central factor in this resilience is a student's mindset about intelligence.[8] Students may view intelligence as a fixed quantity that they either possess or do not possess (a *fixed mindset*) or as a malleable quantity that can be increased with effort and learning (a *growth mindset*).

Students with a fixed mindset believe that their intellectual ability is a limited entity, and they tend to worry about *proving* it rather than *improving* it.[9] 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 my 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. Much research demonstrates the importance of mindsets about intelligence for academic tenacity and performance (see box, "Mindsets about Intelligence and Academic Improvement").

Where do these mindsets come from? In six experimental studies with ethnically, racially, and economically diverse 5th grade students in 1998, researchers Claudia Mueller and Carol Dweck showed how seemingly subtle aspects of praise can have dramatic effects on students' mindsets and resilience.[10] Praising students for their ability taught them a fixed mindset and created vulnerability, but praising them for their effort or the strategy they used taught them the growth mindset and fostered resilience.

In this research, after completing a moderately difficult set of problems from a non-verbal 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 it 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) and a third set that was the same difficulty level as the first set.

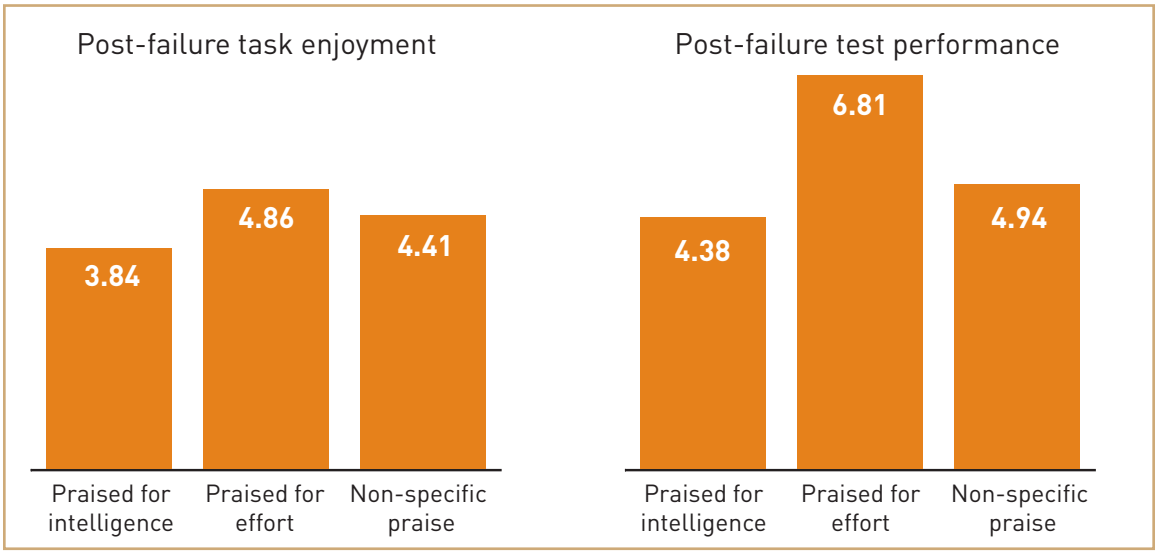
One might think that praising the students' intelligence would create the greatest sense of efficacy, but compared with the other groups, those who were praised for their ability endorsed a fixed mindset and became mired in concerns about their ability. For example, they did not want to try hard problems—problems 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, they performed worse on the third set of problems than they did on the first set, even though the problems were the same level of difficulty (see **Figure 1**).

Mindsets about Intelligence and Academic Improvement

Longitudinal research shows that students' mindsets about intelligence predict their academic performance in real-world settings. Lisa Blackwell of Columbia University and Carol Dweck and Kali Trzesniewski of Stanford University worked with low-income African American, Hispanic, and South Asian students in an urban school setting to examine the students' mindsets about intelligence as they made the challenging transition to junior high school (7th grade). Students' mindsets were assessed at the beginning of 7th grade by asking them to agree or disagree with a series of statements, 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 a growth mindset earned higher grades because they valued learning over looking smart. They saw effort as a virtue, because effort helps to develop ability. And they tended to perceive academic setbacks as a call to increase their effort or to try new strategies. Students with a fixed mindset, on the other hand, 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.

Figure 1: Praising Students' Effort Increases Their Enjoyment of Difficult Tasks and Their Performance



Source: Mueller, C. M., & Dweck, C. S. (1998). Intelligence praise can undermine motivation and performance. *Journal of Personality and Social Psychology, 75,* 33–52.

By contrast, students who were praised for their effort 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 regions of the brain 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.[11]

Students' Achievement Goals

Performance Versus 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.[12] As we have said, 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*—to

perform well (a *performance approach goal*) and to avoid performing poorly (a *performance avoidance goal*). They also aim to exert as little effort as possible, because they tend to believe that high effort will be seen as a sign of low ability.[13]

By contrast, students who endorse a growth mindset about intelligence tend to have *mastery goals* or *learning goals*—to learn and master challenging academic material. For instance, in their series of 1998 studies of praise described above, Mueller and Dweck showed that students who received effort praise chose challenging tasks that could help them learn, while students who received intelligence praise were more likely to choose tasks in their comfort zone that they could perform well on.

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Because students who endorse learning goals tend to seek out academic challenges, persist on difficult academic tasks more, and develop their abilities more readily, learning goals promote academic tenacity.[14]

Obviously, people can have a mix of both learning-oriented and performance-oriented motives, but it appears particularly harmful to have a chronic and singular focus on avoiding failure.[15] Students who endorse the performance avoidance goals 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,* a common strategy that students use to prevent a poor performance from reflecting negatively on their abilities but that can lead them to sabotage their own academic success in the process.[16] For example, a student might postpone completing a class assignment until the last minute or stay up late partying the night before an important test. Although the student can now blame failure on a factor unrelated to her intelligence, she has sacrificed the chance to learn and excel.

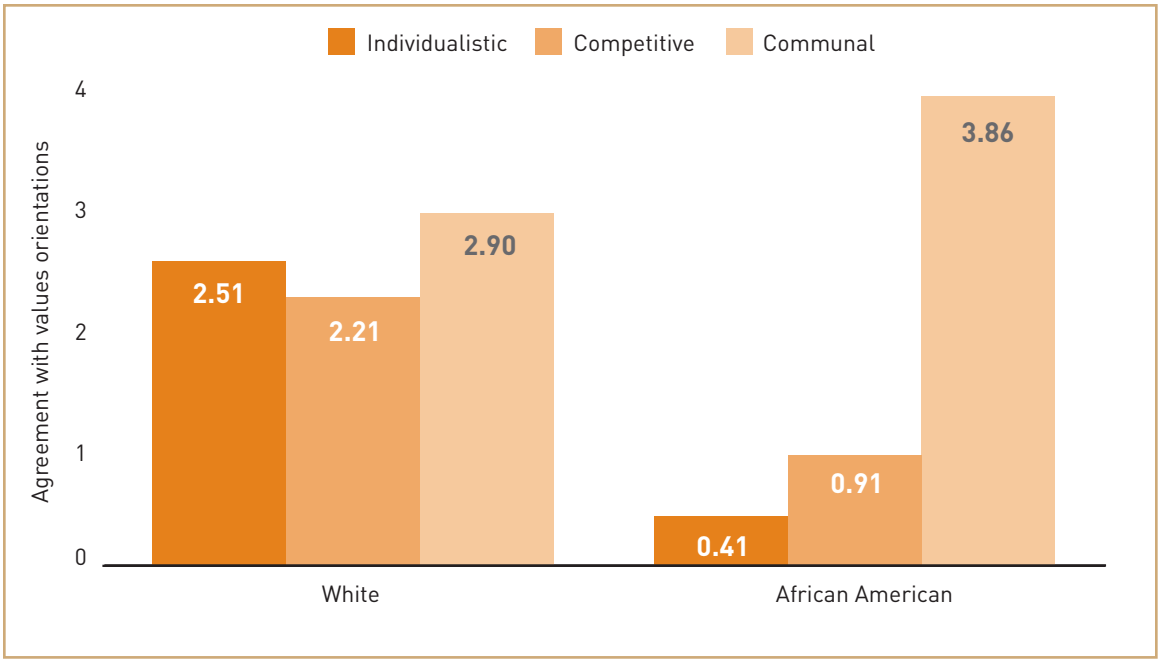
Research also shows that the goal of avoiding failure comes, in part, from a fixed mindset about intelligence. In one study, students who were encouraged to adopt a fixed mindset focused on avoiding failure, while those who were encouraged to adopt a growth mindset focused on learning.[17] Ironically, the students with a fixed mindset saw their fears confirmed: When later given a test, they performed poorly compared to students who had been led to endorse a growth mindset.

Communal Versus 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.[18] Cooperative goals can foster greater motivation through a number of avenues. For example, students working together on a task may feel a greater sense of responsibility to try their best because they do not want to let down their group members.[19] 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.[20] Additionally, because one student's gain is another's loss in competitive environments, students may withhold effort to avoid being stigmatized as a "curve-raiser" or a "teacher's pet."[21] Research suggests that competitive environments are associated not only with lower achievement but also with students liking each other less.[22]

Classrooms that encourage competition and individualistic goals may be particularly ill suited to minority students, who are more likely to be reared in cultural contexts that emphasize the importance of *communal* and *cooperative goals* over *individualistic* or *competitive goals.*[23] For example, one study asked African American

and white 5th graders to read about several high-achieving students who endorsed individualistic values (described as "enjoying solving problems all on her or his own efforts"), competitive values (described as seeking "the challenge of seeing who is best"), or communal values (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").[24] African American and white students both liked the communal students most, but this preference was much stronger among the African American students (see **Figure 2**). Unlike the white students, the African American students actually disliked the peers who endorsed competitive and individualistic values.

Figure 2: Both African American and White Students Prefer Communal Classroom Goals



Source: Boykin, A. W., Albury, A., Tyler, K. M., Hurley, E. A., Bailey, C. T., & Miller, O. A. (2005). Culture-based perceptions of academic achievement among low-income elementary students. *Cultural Diversity and Ethnic Minority Psychology, 11*, 339–50.

Classrooms that encourage competition and individualistic goals may be particularly ill suited to minority students, who are more likely to be reared in cultural contexts that emphasize the importance of *communal* and *cooperative goals* over *individualistic* or *competitive goals.*

Furthermore, minority students appeared 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.[25] The African American students liked the students who endorsed communal values best, but they believed that their teachers would like the students who more often endorsed individualistic or competitive goals.

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 (which is discussed in the next section), as well as their learning and achievement. Unsurprisingly, students are more engaged when the goals of classroom activities match their own values. Research on African American elementary school students has found them to be more engaged and successful at academic activities when these activities involved cooperation with their peers, or were even simply presented as promoting communal goals, than when the same activities were completed individually or presented in competitive terms ("work individually" or "the best team will win").[26]

Along these lines, in a 2004 study researchers asked pairs of 10- to 11-year-old African American students to read a short story together.[27] 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, with statements such as, "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 percent 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, Stanford University psychologist Gregory Walton and his colleagues have found that even students in the majority are more motivated 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.[28] 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 enthusiastically 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*—contribute to their engagement and tenacity.[29] Longer-term purposes, even when they are still developing, can provide a reason for students to adopt and commit to learning goals in school.[30] This is because students who are working with purpose feel that they are learning so that they can become the kind of person they would like to be and contribute something of value to the world. They are not simply memorizing material (that they will soon forget) to pass a test.

Students' higher-order or long-term goals—or *purposes*—contribute to their engagement and tenacity. Students who are working with purpose feel that they are learning so that they can become the kind of person they would like to be and contribute something of value to the world.

Although no study has examined the many facets of youth purpose at once, many studies have examined certain aspects that link to academic tenacity. One of these components is a realistic long-term goal. For instance, a 1994 study showed that African American 8th graders 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.[31] Importantly, this relationship was observed only in 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 plan for working 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 goals need to be seen as relating to schoolwork. For example, one experiment with high-poverty, primarily African American 7th graders led half of the students to reflect on a career goal that required high levels of education—such as medicine, business, or law—and the other half to reflect on a career goal that seemingly did not—such as acting, athletics, or music. When teachers handed out an extra-credit assignment, 23 percent of students who had been led to think about education-relevant careers turned it in, as compared to only 3 percent of students who had thought about seemingly education-irrelevant careers.[32]

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.[33] In one 2009 experiment,[34] researchers told low-income minority middle school students that college completion costs 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 goes beyond the individual. This can foster long-term tenacity,[35] a point to which we return in our discussion of schools that create positive motivational environments.[36] 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.[37] Importantly, similar patterns were *not* found when students were motivated by more self-oriented desires, such as making money or gaining status.[38] Similar results were obtained in 1999 when researchers examined the transition from elementary school to middle school among a group of 6th graders, most of whom were racial minorities.[39] This study found that students who were more motivated to have a positive impact on society also had a stronger desire to learn their course material rather than simply worrying about their ability. The motivation to achieve fame and fortune, on the other hand, had the opposite effect. It went along with less desire to learn and a greater concern about ability.

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 in the Introduction, the researchers noted that their participants "craved one-on-one attention from their teachers, and when they received it, they remembered it making a difference."[40] In addition, those who participated in focus groups reported that some of their best days in school were those when their teachers noticed them, got them involved in class, and encouraged them.[41] In light of these findings, it is not surprising that an important predictor of academic tenacity is students' feelings of social belonging in school, as well as their perception of the quality of their relationships with other students and with teachers.[42]

A sense of social belonging allows students to rise above the concerns of the moment and is linked to long-term student motivation and school success.

Research shows that a sense of social belonging allows students to rise above the concerns of the moment and is linked to long-term student motivation and school success.[43] 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 in spite of what their prior levels of motivation and performance might have been.[44] Although it did not measure students' sense of belonging directly, a study of Italian schoolchildren found that 3rd graders' pro-social behavior—behaviors that lead to positive social relationships in school—predicted their grades in 8th grade even better than did their academic performance in 3rd grade.[45]

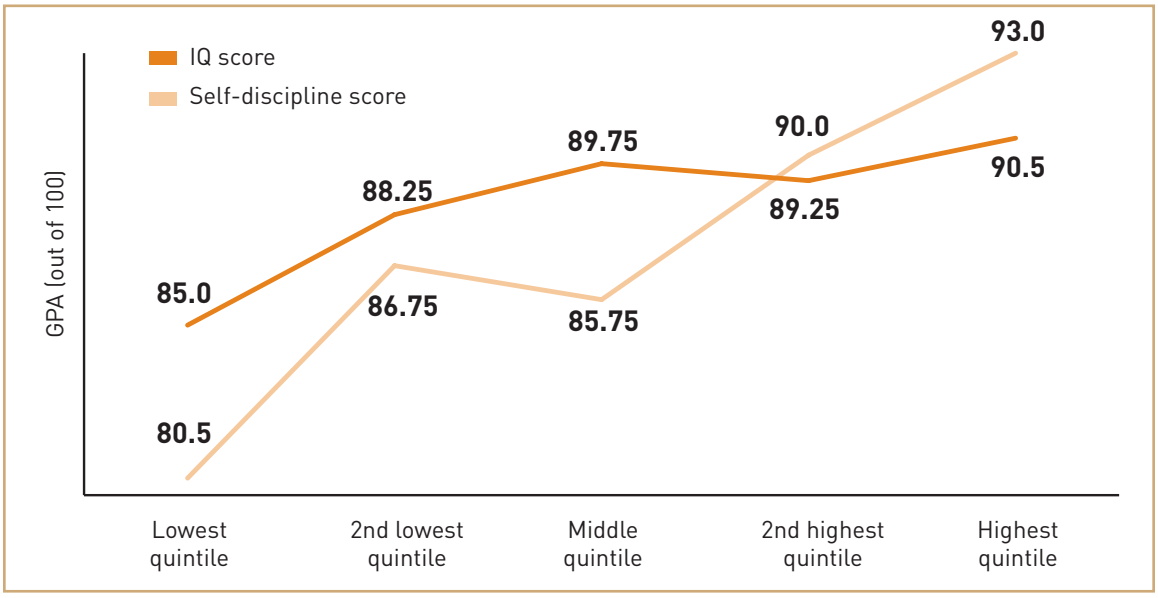
SELF-REGULATION AND SELF-CONTROL

Even if students have the mindsets and goals that encourage tenacity, they may still perform below their potential. But self-regulatory skills—those that allow students to rise above the distractions and temptations of the moment, stay on task, and navigate obstacles to long-term achievement—also contribute to academic tenacity and school achievement. Most educators are familiar with the "marshmallow" studies conducted by Walter Mischel and his colleagues in the 1970s.[46] In these studies, preschoolers in the Bing Nursery School at Stanford University were given a choice between having one marshmallow whenever they wanted, simply by ringing a bell and summoning the experimenter, or having two marshmallows if they waited for the experimenter to return on his own. 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 followed up with the participants and found a significant positive correlation between children's ability to wait as preschoolers and their SAT scores when they were seniors in high school.[47] The longer students waited for two marshmallows at age 4, the better their SAT scores.

Self-control was an even stronger predictor of success than a student's IQ score.

High levels of academic performance often require students to put aside activities that may distract or tempt them in the short term so they can 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 reports from parents and teachers as well as students' self-reports.[48] An average of these measures proved highly predictive of students' final 8th grade GPA, achievement test scores, and whether they were admitted to a selective high school (see **Figure 3**).[49] Additionally, self-control was an even stronger predictor of success than a student's IQ score, as it 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—such as Facebook, Twitter, and text messages—the ability to turn off distractions to focus on a difficult academic task may become increasingly important for success in school and in life.

Figure 3: For 8th Grade Students, Self-Discipline Is a Better Predictor of Academic Performance Than IQ



Source: Duckworth, A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science, 16,* 939–944.

Another important factor in academic tenacity is *grit*, or "perseverance and passion for long-term goals."[50] Self-control involves the ability to resist temptation and control impulses in the short-term, whereas grit emphasizes perseverance in the pursuit of long-term goals. As psychologist Angela Duckworth and her colleagues wrote in 2009, "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."[51] Because high levels of achievement require sustained effort on difficult tasks, grit will be an important predictor of remaining in and succeeding in school. 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—accomplishments that all require increased study time.[52]

What is the relationship 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 show more grit in their academic work.

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 Improve Academic Achievement by Developing 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 (see **Figure 4**) 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.

- **Under certain circumstances, these interventions can be fairly brief yet still produce long-term benefits in academic outcomes that persist months and even years later.**[53] This is because they can trigger enduring changes in the way students perceive their ongoing school experience, which then feed on themselves to produce compounding benefits.

- **Psychological interventions can work hand in hand with other reforms, such as those aimed at curriculum or pedagogy.** For example, in the Concept-Oriented Reading Instruction program (discussed later in this section), teaching children new reading strategies, such as organizing a story graphically, had no impact on their motivation and achievement in reading. But, when accompanied with proven motivational components, student performance rose.[54]

- **Because psychological interventions are designed 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 strategies; instead, they must be customized for any specific site.[55]

Figure 4: 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, African American and Latino 7th grade students	Higher math grades
Good, Aronson, & Inzlicht (2003)	African American and Latino middle school students at a rural school	Higher state test scores for all in reading and for girls in math
Aronson, Fried, & Good (2002)	African American 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)	African American college students	Higher GPA
Cohen et al. (2006; 2009)	African American and white middle school students	Higher grades among African American students in the targeted class
Helping students to see how the curriculum is relevant to their own lives		
Hulleman & Harackiewcz (2009)	White, African American, 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)	African American and Latino middle school students	Higher grades; fewer absences; fewer disciplinary referrals
Brigman & Webb (2007)	Students in grades 5–9 who scored below 50th percentile on state math test	Higher state test scores in reading and math

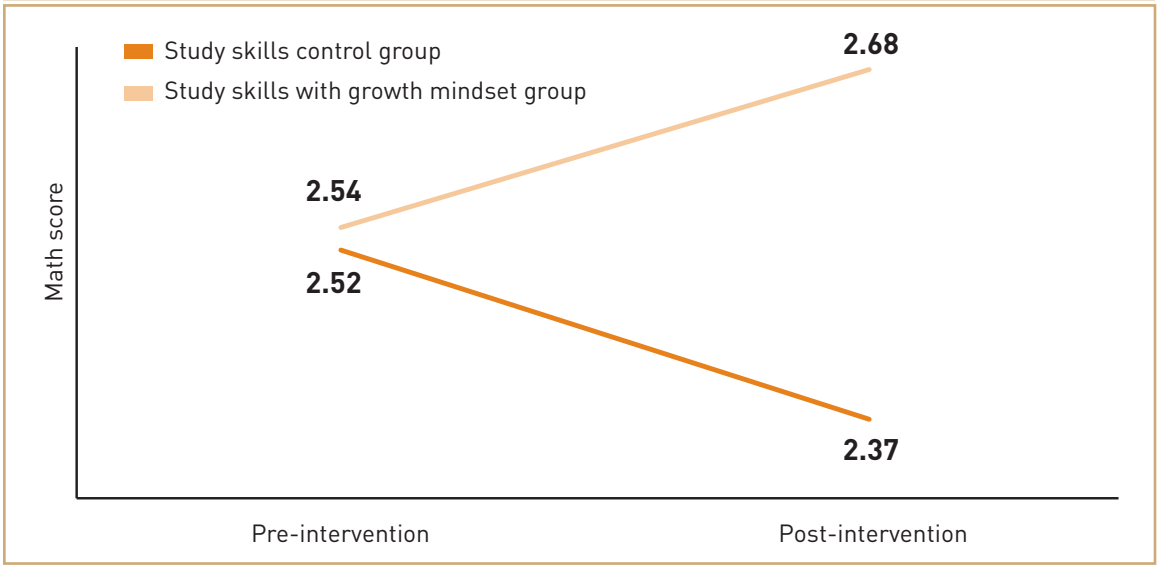
Note: All interventions were randomized controlled trials.

MINDSET INTERVENTIONS

As we have noted, a critical aspect of academic tenacity is the ability to rise above immediate concerns and respond to academic setbacks with resilience. Students who endorse a fixed mindset about intelligence 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[56] and this, not surprisingly, impairs their academic achievement.[57]

Such findings have led researchers to design interventions that change students' mindsets. In one study, minority public school students in New York City were making the difficult transition to 7th grade, and many were already showing declining grades, particularly in math.[58] The students were divided into two groups, with each group receiving a six-session workshop. The control group's workshop focused on study skills, but the students in the intervention workshop learned about both study skills and a growth mindset—how the brain grows new connections and "gets smarter" when a student works on challenging tasks and how to apply this lesson to their schoolwork. Among the control group students, math grades continued to decline, which often occurs in middle school.[59] The students exposed to the growth mindset, however, showed a sharp rebound in math performance (see **Figure 5**). The motivational intervention, it seems, enabled them to put their new study skills into practice.

Figure 5: Entering 7th Grade Students Introduced to a Growth Mindset Perform Better in Math



Source: Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In N. Eisenberg (Ed.), *Handbook of child psychology, Vol. 3: Social, emotional, and personality development* (5th ed.). New York: Wiley.

Reports from teachers and students illustrate how the intervention had this effect. Teachers, who were unaware of which workshop the students were attending, 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. Their comments included: "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)," and "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 on her recent exam."

In addition, inner-city students in 20 schools in New York City completed an online version of the growth mindset intervention, called "Brainology." They almost unanimously reported increases in their tenacity, with comments that included:

- "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 [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 [you] learn something there are connections and they keep growing. I always picture them when I'm in school," and "I imagine neurons making connections in my brain and I feel like I am learning something."

In 2003, researchers obtained similar results with a largely minority low-income sample of 7th graders.[60] In their study, students in an intervention group met with and emailed 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, the students in the intervention group made significant gains on statewide achievement tests administered at the end of the year. The intervention even eliminated the gender gap on math achievement test scores. Equally promising findings have been obtained with minority and non-minority college students (see box, "The Growth Mindset at the College Level").

SOCIAL BELONGING AND VALUE AFFIRMATION INTERVENTIONS

We have seen that 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 research described earlier, other experiments show that even subtle cues that create a sense of social connectedness to others, such as sharing a birthday with someone in a field of study, increase students' motivation in that field.[62] Further, intervention research finds that building students' sense of social belonging in school can lift them out of everyday worries about their belonging and benefit their academic achievement in the long run.[63] 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.[64]

One study tested an intervention to support African American students' sense of social belonging as they made the transition to college.[65] The study exposed first-year college students to information from more senior students who advised that, regardless of ethnicity, almost everyone worries about their social belonging at first, but that over time, these worries dissipate and most students come to feel at home.[66] The intervention

The Growth Mindset at the College Level

In a study published in 2002, college students in a growth mindset group learned how the brain can grow and change when one stretches to learn new things.[61] 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 non-treatment control group and didn't write any letters.

Only students in the growth mindset group profited from their intervention. Both white and African American students in this group earned higher GPAs 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 the way they deal with challenges and setbacks in their school environment, making them more tenacious learners and higher achievers.

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 also were 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 white students, but it had important benefits for African American students, the group negatively stereotyped in school. 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 three years.[67] In spite of its brief duration, the intervention reduced the black-white achievement gap over this three-year period by 52 percent.

Many students, especially those who face negative stereotypes in school, may not feel that the attributes they value most in themselves—their sense of humor, their relationship with their family—make them valuable in the school setting. By thinking about and elaborating upon these qualities, students can "bring" these values into the school setting and thereby enhance their sense of belonging.

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 among African Americans who received the belonging intervention, adversity did not have this effect. These students also reported that they took greater advantage of opportunities for learning, such as taking more challenging classes, 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 suggest that this strategy helps buffer them against the difficult transition to middle school.

In other research, Stanford education and psychology professor Geoffrey Cohen and colleagues have investigated a "values affirmation" intervention, which reminds students, in the school setting, of the things that they value in themselves.[68] Many students, especially those who face negative stereotypes in school, may not feel that the attributes they value most in themselves—their sense of humor, their relationship with their family—make them valuable in the school setting. By thinking about and elaborating upon these qualities, 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 in school settings for students who face negative 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 ranked 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 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 percent—a rate almost identical to historical norms for the course—to only 9 percent.[69] A few booster exercises reinforced the intervention during the year. During both that year and the following year, 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.[70] Like the belonging intervention, the affirmation intervention robbed academic adversity of its power to undermine students' belonging and tenacity.[71]

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 first describe two short-term experiments and then discuss a full intervention.

One strategy to instill personal relevance in academic activities is to show connections between what a student is learning and a larger social purpose. For example, Hyungshim Jang showed in a 2008 study that when college students were told that a relatively uninteresting academic 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.[72] 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, a 2004 study 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.[73]

The affirmation intervention robbed academic adversity of its power to undermine students' belonging and tenacity.

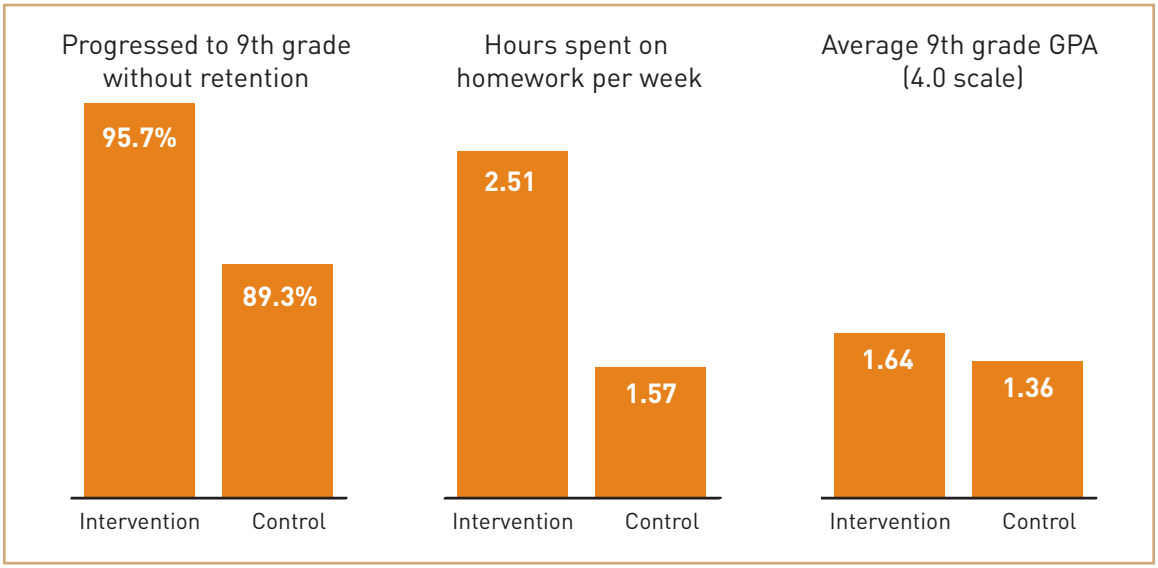
In 2009, researchers Chris Hulleman of James Madison University and Judith Harackiewicz of the University of Wisconsin-Madison developed an intervention to encourage high school students to see the relevance of science to their lives.[74] Every three to four weeks in a semester-long science course, students were asked to write a brief essay describing how the material they were studying that week 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 of working hard in science. As predicted, those in the intervention group expressed more interest in science at the end of the academic term and earned higher science grades than students in the control group. The increase in grades for these students represented nearly two-thirds of a letter grade, a striking increase.

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 them specify ways to become this person may be especially effective.

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.[75]

Another approach to heightening students' sense of purpose is to target 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 them specify ways to become this person may be especially effective. One study tested such an intervention among low-income African American and Hispanic 8th graders in an inner-city school district.[76] Students took part in a 10-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 written up for disruptive behavior, were 60 percent less likely to repeat 8th grade, and earned significantly higher grades in 9th grade (see **Figure 6**).

Figure 6: 8th Graders Who Envision Their Future Self Perform Better



Source: Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91,* 188–204.

Similar findings were obtained 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 these future selves, 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.[77]

TEACHING SELF-REGULATION

A promising intervention, known as the Student Success Skills program, shows how schools can provide support that cultivates goal-setting and self-management strategies.[78] The intervention, which focuses on 5th to 9th graders who score below the 50th percentile on their state achievement test in reading or math, emphasizes the skills that help students thrive in challenging situations. The chief program components include teaching children how to set goals, monitor their progress toward those goals, and handle high-pressure situations. In weekly, hour-long small group sessions, children learn stress-management techniques, such as breathing deeply and imagining a "safe place where [you] feel protected and in control … a caring, supportive, and encouraging place to learn." 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.[79]

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.

Beyond stress management, goal-setting and self-regulation also are inculcated in students. For example, on weekly worksheets, students monitor their success at developing 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. Because the program teaches students general life skills, its positive effects also should, in principle, generalize to other areas in their lives.

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,[80] in-class exercises,[81] or out-of-class workshops,[82] some research focuses on strategies that integrate motivational ingredients into the school curricula. For instance, the Concept Oriented Reading Instruction program[83] incorporates content that is relevant to students' lives,[84] fosters student choice,[85] and affords opportunities for success to build students' self-efficacy.[86] The program also is collaborative to increase social motivation[87] and emphasizes mastery and learning.[88] A review of 11 studies involving 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.[89]

How Good Teachers and Schools Foster Academic Tenacity

Up to this point, we have discussed tenacity as a property of the student that can be measured and instilled through psychological interventions. But tenacity also is 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 do so more successfully. However, it also is important to look at what schools currently do, and to see how the concepts we have discussed—mindsets, goals, belonging, affirmation, and self-regulation—illuminate the factors that distinguish good schools and good teachers.

Exceptional teachers and schools continually reinforce the message that their students "belong" in school 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, through schools of education, and through collaboration between researchers and teachers. In others, the practices of successful educators have "trickled up" to influence the ideas of researchers. But even in these cases, the research has proved critical and has helped to explain the key ingredients of the practice.

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.

Below we summarize the properties of teachers and schools that appear to foster student tenacity and performance. We separate the 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.[90]

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.[91] According to the U.S. Department of Education's "What Works" Clearinghouse, "rigor" is one of two schoolwide strategies for reducing dropout rates that has received the strongest scientific support.[92] (The second, pertinent to belonging, discussed later in this section, is a "personalized learning environment.")

Large-scale 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.[93] The same results were found at both a predominantly white 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.[94] In the seminal study, 1st and 2nd 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 identified that way.[95] This occurred in spite of the fact that the students identified as bloomers had, in fact, been chosen at random by researchers. Although the study sparked academic debate, the weight of three decades of research confirms the reality of the self-fulfilling prophecy and its impact on teacher practice and student learning.[96,97]

Students Respond to Challenges

Success stories demonstrate 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 spite of troubling statistics on minority student achievement, dramatically raised the grades, test scores, and college prospects of African American and Latino youth. Although they differ in many respects and have many components, these diverse success stories share a common emphasis on challenge.[104]

- Jaime Escalante, portrayed both in the movie *Stand and Deliver* and in a 1988 book[105] by *Washington Post* education writer Jay Mathews, 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 percent 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. Yet, incredibly, in 1987, Escalante's students accounted for 26 percent of all Mexican Americans receiving college credit on their AP calculus exam in the United States, and the rate at which his students passed the AP exam compared well with many privileged suburban schools.[106]

- St. Mel 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, expecting students to understand the subject matter at a deep conceptual level rather than at a surface level and giving them large quantities of substantive feedback on their written work. 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."[107] For the past seven years, 100 percent of graduating seniors from St. Mel 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 4,000 students, has an impressive track record. Every year since 1993, Xavier has placed more African American students into medical schools than any other institution of higher learning.[108] Xavier sets highly demanding standards, with a rigorous curriculum and an intensive college preparation program that begins the summer before freshman year. Xavier's prospective pre-medical students are inundated with information on careers, especially in science and health, beginning in freshman year. Epitomizing the growth mindset, Norman Francis, Xavier's president, 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."[109] Similarly, Dr. Arthur Whimbey, one of the scholars who created the curriculum at Xavier, captured this growth mindset philosophy in the title of his book, *Intelligence Can Be Taught.*

Consistent with research on the importance of early intervention,[98] the self-fulfilling prophecy is most effective 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.[99] Earlier we discussed how minority students in particular may feel that they don't belong in school and, therefore, may especially respond to positive messages of growth and belonging from their teachers.[100] 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.[101]

Why do high expectations promote student motivation? Two mechanisms seem particularly important.[102] 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 feelings toward them, in the form of constructive feedback and encouragement. These factors—attention and positive affect—also exemplify high-functioning classrooms.[103] (See box, "Students Respond to Challenges.")

In contrast, a lack of challenge characterizes less effective schools and teachers. Unfortunately, this appears to be the rule more than the exception. For instance, educators often over-praise mediocre work,[110] especially the work of students from racial minorities,[111] 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.[112] 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—more than any other ethnic group—reported receiving the lion's share of praise from their teacher—even though they spent the least time on homework and received the lowest grades.[113] 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 a lack of challenge permeate many approaches to the education of at-risk minorities.[114]

Attention to Students' "Psychology"

High standards alone are not enough. Echoing a key theme of this report, high standards must also be *perceived* as such by the students—and they must be perceived as attainable. This is a critical subtlety. Policymakers 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, but this is very often not the case.[115] The effects of any educational intervention depend on its psychological meaning to the students.[116]

High standards must be perceived as such by the students—and they must be perceived as attainable.

As a consequence, results can depend 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 more rigorous work may be seen as threatening or overwhelming, and students may view setbacks as a confirmation of 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, increased attention may be negative for some students, and a feeling that one does not belong may sometimes be greater in a small pond than it would be in a larger pond. The psychological research discussed earlier underscores the importance of tending to students' perceptions and experiences, and effective educators make an effort to do so.

These considerations are especially important during 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.[117] Many students may see this difficulty as 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.[118] During these transitions, educators must take particular care to encourage optimistic perceptions that can displace the more destructive perceptions students might otherwise have. Teachers can encourage these optimistic perceptions by giving students the message that success is attainable through their own dedication and the available instruction. The interventions discussed earlier taught students a growth mindset and 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.[119] Students are invited to participate based on their demonstrated academic potential, and the programs feature more difficult coursework than the standard remedial program. In these honors programs, the high standards—and the assurance that students can reach them—are explicit. In such a context, students can readily see any difficulties they have as a sign of high standards, not limited potential. They also can see success as more of a validation of their ability to excel than success in the absence of high standards.

Holding students to high expectations, 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 that research has shown enhances motivation and performance.

These programs yield positive results. For example, mathematics professor Uri Treisman's program—a college calculus workshop—not only boosted minority students' grades in calculus, but also increased their likelihood of graduating from college.[120] 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 percent of students in AYD repeated Algebra I, whereas many more of the students not in the program (24 percent to 40 percent) repeated the course.[121]

Holding students to high expectations, 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 that research has shown enhances motivation and performance. 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 educators who are willing and able to support their students in meeting these higher standards.

SCAFFOLDING

The term scaffolding was introduced in the pioneering work of Jerome Bruner and his colleagues to refer to the kind of support a skilled tutor provides to a student.[122] This support 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.

Cognitive Scaffolding

Instructional or *cognitive scaffolding* is of great importance under challenging conditions. Students must have the cognitive support they need to reach the high standard. This is why good pedagogy and a solid curriculum are vital, but pedagogy requires more than the presentation of academic material.[123] 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.[124] Research shows that even handwritten comments on report cards, suggesting strategies for improvement, can reduce the likelihood of students' dropping out of school.[125] High-quality feedback is among the strongest predictors of student accomplishment and teacher effectiveness.[126] Part of the effectiveness of such feedback lies in the evidence it provides of the teacher's commitment to learning and belief in the student's capacity for growth.

Many of the success stories discussed earlier use cognitive scaffolding to ensure that students meet a high standard. At St. Mel, for example, there are intensive pre-exam review sessions and quizzes, which contain 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 also are 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.

Over 90 percent of the comments from the best tutors are questions, and these questions gently prod the students to greater understanding.

Studies of tutors who have been nominated as highly effective by schools and tutoring agencies provide a similar illustration of cognitive scaffolding. Instead of giving direct answers and feedback, these expert tutors use hints, often providing incrementally more specific hints until the child answers a question correctly.[127] Expert tutors also use questions rather than instructions (e.g., "Why did you borrow a 2 rather than 1?"). Remarkably, over 90 percent of the comments from 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, even with children who have a history of failure.[128]

Expert tutors, like effective teachers, continually try to take the perspective of their student.[129] 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 predominated in educational debates.[130]

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

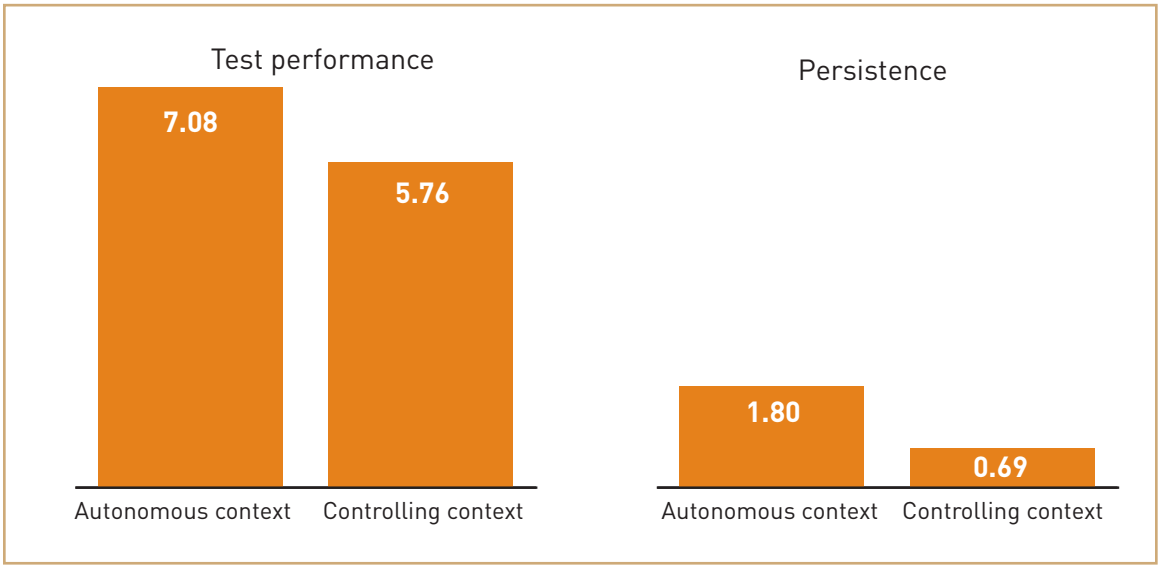
Motivational scaffolding refers to the support that educators can provide to promote the motivational tools students need to meet challenges in the classroom and beyond. Such motivational tools include goal-setting and self-management strategies, as well as healthy motivational orientations. *Scaffolding healthy motivational orientations* refers to how school environments can help to create 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 academic tenacity.

Research by Dominique Morisano and her colleagues provides an example of motivational scaffolding supporting goal-setting and self-management strategies.[131] Their study showed that a goal-setting regimen helped college students earn better grades and stay in school. St. Mel trains students in goal-setting strategies by, for example, encouraging students to jot down specific, concrete goals through the use of planning books.[132] This practice resonates with classic self-efficacy research showing that the simple act of breaking long-term lofty goals into concrete and short-term steps promotes student learning and motivation.[133] The Student Success Skills program also promoted not only goal-setting and self-management strategies, but also strategies for coping with stress.[134]

Positive feeback about performance can improve student motivation, but adding a tone of control undermines it.

Supporting Student Autonomy. Self-determination theorists have examined the conditions under which students' intrinsic motivation to learn is maximized.[135] 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.[136] 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.[137] A field experiment in which high school students were 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 ("You *might* decide to learn more" versus "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 (see **Figure 7**).[138] Similar findings have been obtained in more academic content areas as well.[139]

Figure 7: Autonomy-Supportive Teaching Improves Student Performance in Both the Near and Long Term



Source: Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: The synergistic role of intrinsic goals and autonomy support. *Journal of Personality and Social Psychology, 87,* 246–260.

Studies also find that teachers sometimes unnecessarily constrain student autonomy by giving continual commands; providing solutions before the student has had an opportunity to solve a problem independently; limiting choices for reading and writing exercises; and dispensing unnecessary incentives like gold stars, rewards, and bribes for good work, such as extra recess time.[140] It's important to note that autonomy-supportive classrooms are not laissez-faire.[141] Instead, they structure activities in a way that advances concrete goals for learning but that simultaneously encourages 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 to achieve an extrinsic end, such as money or fame. Although gold stars, prizes, and other extrinsic rewards may have their place—for instance, as a last resort to jump-start a desired behavior or as a symbol of competence and belonging[142]—educators should use them judiciously, as they can easily overshadow any intrinsic reasons for a behavior.[143]

In the midst of efforts to raise student performance through economic incentives,[144] it is revealing that many studies demonstrate how academic tenacity is fueled more by intrinsic goals than by extrinsic ones.[145] For example, in the physical education study described earlier,[146] 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").[147] These findings dovetail with research showing that arguments based on compassion and social purpose can often work better than those based on advancing personal gain.[148]

As developmental psychology professor Maarten 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."[149] Even the subtlest 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 (see box, "Motivational Messages Can Be Subtle").

Motivational Messages Can Be Subtle

Studies show that even small cues can support or thwart healthy motivational orientations in students, and even well-intentioned practices can have negative consequences. Praising intelligence or providing a lot of positive feedback 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."[150] Likewise, longstanding practices in school, such as public honor rolls for grades and 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.[151]

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.[152] For instance, students displayed greater interest and intrinsic motivation for a new sport when they learned it from an instructor who they believed was intrinsically motivated (an excited volunteer) rather than extrinsically motivated (a paid professional).[153] This occurred in spite of the fact that the behavior of the instructor was entirely scripted and consistent across the two groups of students. Moreover, these motivational effects were contagious. 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 can spread through an entire classroom, perhaps creating a climate of healthy intrinsic motivation or less healthy extrinsic motivation. 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—not just for teachers, but also for their students.

Several studies also show a strong connection between students' perceptions of educators' motivational orientations 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 and that teachers emphasized effort and understanding were, in turn, more likely to espouse learning goals themselves. They also felt more confidence in their ability to succeed in school, which, in turn, predicted improvement in GPA.[154] Likewise, another large-scale study, which focused on four ethnically and economically diverse school districts in the Midwest, demonstrated how school climate can shape student goals.[155] During the school year, there was a steady drop in both 6th and 7th graders' beliefs 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, demonstrating that "teachers can substantially influence the efficacy beliefs of their students simply by placing emphasis on learning and improving understanding."[156]

BELONGING

Beyond challenge and scaffolding, learning environments that promote academic tenacity also cultivate students' feelings of belonging—a sense of fellowship with peers and teachers. A large body of evidence shows that a sense of belonging is especially important for students in middle and high school. With the transition to adolescence, students too often take a negative turn.[157] Poor performance can set off a downward spiral, increasing the risk of withdrawal from school, grade retention, disciplinary infractions, and behaviors that present risks for health.[158] 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 more anonymity as students move between classes with different teachers and students throughout the day and more invidious social comparison, competitiveness, and judgment among peers.[159] Such conditions also can 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 risky behavior.[160]

Earlier we described how students' sense of belonging predicts their academic success. Belonging, in fact, is one factor that schools can build to improve the lives of their students across a host of outcomes. In a large study of more than 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.[161] (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.

Holding students to high standards and giving them the attention and scaffolding they need to meet those standards sends the message of personal concern. In a sense, good teachers are like good parents—at times authoritative but consistently caring.

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," Lisbeth Schorr, a senior fellow at the Center for the Study of Social Policy, wrote in a 1994 article.[162] 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 when they felt a connection with their teachers.[163] Many also wished that more had been demanded of them. Holding students to high standards and giving them the attention and scaffolding they need to meet those standards sends the message of personal concern.[164] In a sense, good teachers are like good parents—at times authoritative but consistently caring.[165]

Indeed, educators' willingness to connect with students' lives outside of school appears important to the success of several academic interventions.[166] They can do so even through simple exercises. Reminiscent of the affirmation intervention discussed earlier, some teachers have found that expressive writing, in which under-privileged children relate their life troubles to social values and literary stories, can have dramatic positive effects on the students' engagement with school.[167] 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.[168] Students come to see school as a place that has their best interests at heart.[169] Similarly, expert 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.[170] From an outsider's perspective, such time on non-academic 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 was one of the strongest predictors of their interest in school and in their coursework.[171] These factors, in turn, predicted higher GPAs. 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.[172] Finally, when high-risk youth have opportunities to form caring relationships with peers, teachers, and role models in extracurricular programs, they are less likely to drop out of school or be arrested.[173]

Educational environments that promote belonging often harness small groups or "communities of learners" within the classroom.[174] Such approaches have their roots in the seminal work of the social psychologist Kurt Lewin,[175] 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,[176] Uri Treisman's calculus workshops,[177] and Elizabeth Cohen's Complex Instruction.[178] Additionally, the Interactive Engagement methods, which are informed by psychological research and increasingly characterize science education, intersperse lectures with conceptual questions that students reflect on and then discuss in a group of peers until they agree on 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 show that students taught with this method make almost twice the gain in conceptual knowledge of science that students taught with traditional methods do.

Group learning helps students to see that their difficulties with the course material are often shared, not necessarily unique to oneself, and it fosters a social identity around coursework, which itself can be motivationally galvanizing.

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 its instructional benefits, group learning also has motivational benefits. It helps students to see that their difficulties with the course material are often shared, not necessarily unique to oneself, and it fosters a social identity around coursework, which itself can be motivationally galvanizing.[179] 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 also that they will help their classmates as a group to do so.[180] For example, the promising Knowledge is Power Program (KIPP), which serves under-privileged students, sets high standards through a rigorous college-preparation curriculum.

Students spend 60 percent more time in the classroom than their peers in neighborhood schools, attending class on Saturdays and for parts of the summer. The program also creates a strong culture of teacher and student support. A motto at KIPP is "team beats individual."[181] Indeed, students adopt a social identity as a "KIPPster."[182]

In summary, a rigorous, supportive learning environment characterizes schools that promote student tenacity. This lesson accords with the National Research Council's assertion that "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."[183] Although the actual teaching strategies and curricula that best serve students vary greatly, educators at every level can promote tenacity by sending the message, in word and deed, that their students truly belong and have great potential.

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