

STUDENT ACADEMIC MINDSET INTERVENTIONS

A Review of the Current Landscape

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FOREWORD

Our efforts to improve the education of our most vulnerable children appear at an impasse. Despite some notable, but limited exceptions, we continue to fail to provide too many poor students and students of color with the opportunities to experience the success and fulfillment in personal, professional, and civic life that is made possible by a good education. Indeed, achievement gaps in secondary school have largely remained stagnant, and in some cases, grown over the past quarter of a century.

In many of our leading examples of schools serving these students, we see instructional models and school cultures that lead to incredible growth on standard K-12 measures of academic performance (e.g., test scores, course-taking, and high school graduation rates). However, as many of these exceptional practitioners themselves call out, a surprisingly high proportion of their students – well prepared on paper by every measure – enter college only to leave without a degree or credential to show for it.

Other schools have shown remarkable success engaging students by designing instruction to meet their interests, creating small, tight-knit communities, and encouraging participation in “real world” learning opportunities. Many of these schools, however, have been unable to hit the bar in terms of academic intensity—their students, too, may seek to continue their education beyond high school but often lack the skills and knowledge to succeed in more challenging academic environments.

And then there are the so-called dropout factories: far too many schools in which students aren’t learning, and are disaffected and disengaged from their education. For a number of reasons— instructional quality, lack of supports, unsafe learning environments, and otherwise, many of

the students at these schools don’t exhibit the academic behaviors necessary to gain proficiency in core knowledge and skills, earn good grades, and graduate from high school.

While their profiles differ in many ways, we believe these three cases offer an important lesson that cuts across drastically different school environments and is broadly applicable to the system as a whole. For students to excel in both school and life, they must value the power of their intellect and possess academic mindsets that support engagement in learning, satisfaction and confidence from wrestling with (and mastering) challenging new material, and embracement of the lessons to be gleaned from failure. Such motivation and dogged persistence, however, represent only one half of the equation. Students also need a concrete set of strategies that enable them to make progress, especially when they hit a wall: they must be able to set achievable goals, articulate a strategy to achieve them, monitor their learning, and adjust tactics as necessary. These academic mindsets and learning strategies distinguish lifelong learners capable of truly owning and driving their own learning.

Research from a variety of academic disciplines has shed light on the types of contextual factors in schools that encourage this ownership of learning. These contextual factors include: caring, respectful relationships among adults and students; opportunities to experience autonomy, challenge, and contributing to the greater good; and the communication of high expectations and personal assurances that success is possible, coupled with strong feedback that helps students navigate a path to achieve it. Until we determine how to translate these insights into practices and routines in the classroom, however, we will be hard-pressed to transform the learning trajectories of those

students whose futures most depend on receiving a good education at school.

Through the course of the past year, the Stupski Foundation brought together and worked closely with the Learning Lab Network – a pioneering group of students, teachers, district and state leaders, and community representatives – to articulate what it looks like when students truly own their learning. The Learning Lab Network also invested a great deal of time focused on what classrooms, schools, and instruction should look like to foster the necessary mindsets and learning strategies. The Foundation asked IMPAQ International to conduct a review of existing academic mindset interventions to support this work. This report grew out of their review of the research literature and conversations with several leading experts in the field. We hope that this collection of interventions and insights will inspire and advance others' efforts to empower students and equip them with the education they need and deserve.

In sharing this report with the field, we want to be clear that we are not naïvely asserting that changing students' mindsets will teach them to

read or do mathematics. Improving a student's orientation toward learning and her beliefs about the nature of intelligence sparks a positive, recursive process that fundamentally changes what she absorbs from the available learning opportunities. Attending to these factors is necessary but not sufficient—quality curriculum and instruction must be in place for a student to acquire the required knowledge and skills.

We do believe, however, that the urgency of promoting student ownership of learning could not be greater. The implementation of the more rigorous Common Core standards in the coming years will only ratchet up the expectations and the difficulty experienced by students—many of whom lack basic proficiency under current expectations. Equipping students with the right mindsets and strategies will enable them to engage productively with this more challenging material. To this end, we must unleash the energy and insights of students to improve education for all their peers – but especially for those who need it the most.

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STUDENT ACADEMIC MINDSET INTERVENTIONS: A Review of the Current Landscape

Throughout the past year, the Stupski Foundation worked closely with researchers and with students, teachers, district and state leaders, and community members in six states across the country to articulate what it looks like when students own their learning and what it takes to encourage such ownership. The foundation's aim was to find ways to address the large and growing educational needs of high-risk students in underperforming middle and high schools. As part of this effort, the foundation asked IMPAQ International to review existing interventions aimed at building academic mindsets central to student ownership of learning (Figure 1 depicts the foundation's definition of "student ownership of learning", which is comprised of both academic mindsets and closely related learning strategies).

This research-based overview outlines the core problems, concepts, and theory of action underlying student academic mindsets and learning strategies and their connection to academic achievement. Our review summarizes trends and highlights promising interventions and tools that educators serving low-income students and students of color particularly African-American and Latino students might adapt to their local contexts in order to help their students engage, persist, and succeed in school and beyond.

This summary is not an exhaustive review of the literature and research; rather, it targets relevant knowledge in the field, with a particular focus on interventions that schools could successfully adapt and implement. As part of our review, we interviewed a number of experts in the field: researchers who have built the underlying evidence base and studied these interventions, practitioners who have developed and implemented

interventions, and funders. The interviews focused on the state of the field, promising tools and practices (including those that have not yet been well studied), the context in which they appear to be most effective, their implementation, and how to measure mindset-related outcomes.

In **Section I** of this review, we define the concept of academic mindsets and a set of closely related learning strategies, and we explain the theory of action that describes the relationship between academic mindsets and learning strategies, and student learning and academic outcomes.

In **Section II**, we summarize the important trends in education practice and reform related to these academic mindsets and closely related learning strategies including:

- 1) Promising tools, practices, and strategies focused on promoting positive academic mindsets and learning strategies, as well as their underlying theories
- 2) The type, scope, and extent of implementation of these approaches
- 3) The body of evidence on these approaches, including their effects on learning outcomes, particularly for low-income students and students of color.

In **Section III**, we discuss implementation considerations, outlining the ways in which school and classroom context may affect their implementation and efficacy.

In **Section IV**, we summarize recommendations and important considerations for those who play key roles in further development, evaluation, and adoption of these tools and practices.

FIGURE 1.

Key components of student academic mindsets and learning strategies

PASSION & PURPOSE

I am motivated to learn

- I have a passion or purpose that drives me to learn
- I enjoy learning new things

IDENTITY & COMMUNITY

I am a learner and a contributor

- I value the power of my mind
- I am willing to speak up to get what I need to learn best
- I take pride in contributing to my learning community as both a learner and a teacher

GRIT & GROWTH

I build my ability by seeking challenging experiences

- I know my intelligence grows when I push through learning challenges
- I recognize my power to shape my future and make wise choices that prioritize my learning
- I am determined to persist in the face of difficulty to reach my goals
- I have experienced success and I am confident I can learn new things

LEARNING STRATEGIES

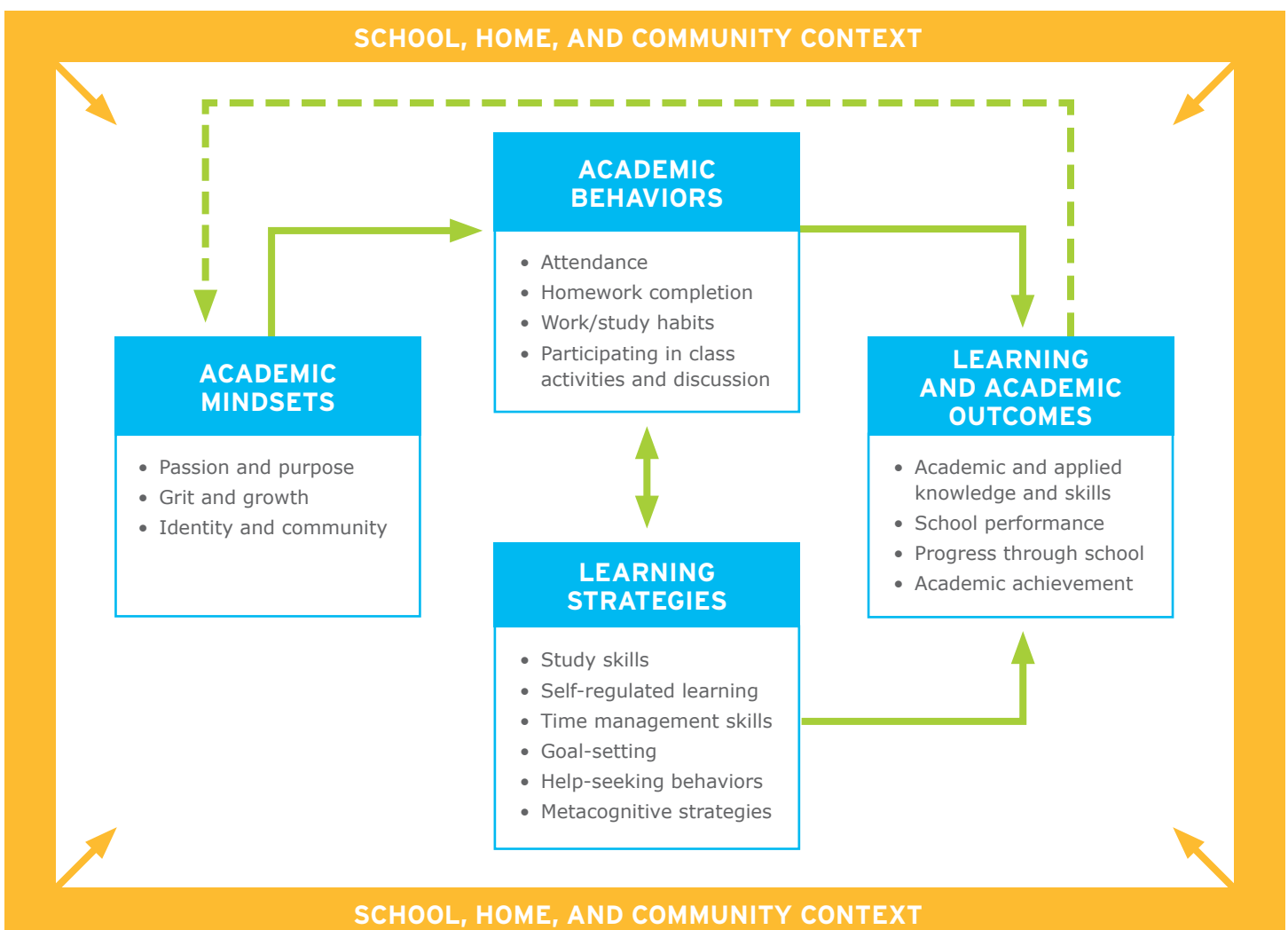
I know how to learn

- I set goals for what I will learn, make plans, monitor my progress, and adjust as necessary
- I know how to manage my time effectively to achieve my learning goals
- I have techniques to help me understand, organize, and remember new facts and ideas
- I know when, how, and from whom to seek help and will do it

SECTION I: Definition and Theory of Action

The term *academic mindsets* refers to the student attitudes, beliefs, and dispositions about school and learning that are associated with positive academic outcomes and school success. The core logic behind a focus on academic mindsets is that student attitudes, beliefs, and dispositions affect the quality, duration, and intensity with which students engage in critical academic behaviors (e.g., attending class, studying) and deploy learning strategies that, in turn, can powerfully affect student learning and academic outcomes. Drawing from existing research and writing in the field (particularly Farrington et al., 2012, and Yeager & Walton, 2011), we have outlined a theory of action that describes the hypothesized relationships between students' academic mindsets, a key set of learning strategies, and their academic and learning outcomes. This theory of action, illustrated in Figure 2 and described below, forms the basis for this review.

FIGURE 2. Theory of Action



Core Components of the Theory of Action

Simply put, our theory of action (Figure 2) posits that academic mindsets foster behaviors that can improve academic and learning outcomes.

ACADEMIC MINDSETS

The theory of action diagram (Figure 2) references three interrelated components that make up academic mindsets, as categorized in the Stupski Foundation’s definition of student ownership of learning (see Figure 1):

- Grit and growth
- Identity and community
- Passion and purpose.

Grit and growth stem from the belief that intelligence can “grow like a muscle.” Students with this set of beliefs, attitudes, and dispositions:

- Believe that intelligence is malleable
- Have confidence in their ability to shape their future and to learn new concepts and material
- Value their own efforts to achieve academic and learning goals.

Research and interventions in this area have focused on the extent to which students believe that cognitive ability increases as a result of the effort to struggle through challenging learning experiences, as opposed to believing that individuals are born with a certain amount of ability or intelligence that can never change. *Grit* refers to the determination and drive necessary to stay focused, persist in the face of adversity, and stick with difficult tasks in order to achieve goals. It also refers to the self-control and delayed gratification that allows one to resist temptation or delay rewards in order to complete tasks or meet goals (e.g., choosing to do homework over watching television) (Farrington et. al., 2012). Many have hypothesized that students with a growth mindset are more likely to have the determination—the grit—necessary to persist through challenges and work toward long-term goals (Dweck, Walton, & Cohen, 2011).

Identity and community result when students have a sense of legitimate membership in a classroom or school learning community. The core idea is that students who value the power of their minds—their academic identity—also:

- Take pride in belonging to their learning community
- Are comfortable speaking up and actively engaging in the learning that takes place in that community
- Contribute to the building of a learning community through their engagement as a learner and a teacher of others.

Passion and purpose result when students find schoolwork and learning to be intrinsically enjoyable, interesting, as well as valuable in “the real world” beyond school. This concept includes the extent to which students:

- See the connection between school and future goals, careers, and success
- Value learning, both for its own sake and for what it can do for them
- Find the content of school learning relevant to themselves and their communities.

BEHAVIORS AND STRATEGIES

The behaviors and strategies that help students to achieve academic and learning outcomes may arise from or be improved by students’ academic mindsets.

Academic behaviors are strongly associated with being engaged and successful in school. They include attending class, spending time on homework, participating in class activities and discussions, and coming to school organized and ready to learn. These behaviors have been shown to be related to improved student outcomes, including course grades, credit accumulation, grade promotion, test scores, and graduation (Allensworth & Easton, 2007).

Learning strategies enable students to tackle challenging material, learn, create, and share new knowledge, and to achieve success in school and beyond. In this paper, we focus on those learning strategies that are most related to academic mindsets, such as setting learning goals, making plans to accomplish these goals, monitoring progress, seeking help, and changing the course of action when necessary. Successful students tap specific learning skills, including:

- Metacognitive: awareness of and control over their learning processes and strategies
- Self-regulated learning: intentional monitoring of their learning, assessment of their success, and adjustment as needed to achieve learning goals
- Cognitive skills: rehearsal, organization, and elaboration
- Time management (Farrington et al., 2012).

As depicted in Figure 2, learning strategies and academic behaviors may have reciprocal effects on each other. Students who attend school, participate in class, and do their homework have opportunities to develop effective learning strategies. Likewise, learning strategies such as metacognitive, cognitive, and time-management skills help students develop the behaviors that lead to academic success.

ACADEMIC AND LEARNING OUTCOMES

Research has shown that academic behaviors and learning strategies are related to academic and learning outcomes, including academic and applied knowledge, school performance, progress through school, and academic achievement.

Academic and applied knowledge comprises the literacy and mathematics skills, content knowledge, and higher-order thinking skills that are necessary to perform well in and out of school. Academic knowledge helps students to apply content and skills in academic contexts, while applied knowledge helps them apply academic concepts and skills

outside the classroom. Students need both kinds of knowledge to be successful in college and careers.

School performance refers to students' classroom achievement, particularly with regard to course grades, credit accumulation, and other measures of school success. School performance is strongly related to the next outcome, progress through school.

Progress through school can be defined as the movement of students through the pipeline from elementary school to high school and beyond. Students who perform well in school are likely to progress through school and stay on track for graduation. Research has shown that students who are on track for graduation at the end of ninth grade—still near the beginning of their high school careers—are significantly more likely to graduate from high school than those who have fallen behind (Allensworth & Easton, 2007).

Academic achievement is usually measured by scores on academic tests or other demonstrations of academic proficiency.

Logic of the Theory of Action

The core logic behind our theory of action is that academic mindsets influence students' academic behaviors and strategies, which in turn facilitate academic success (Farrington et al., 2012; Yeager & Walton, 2011).

As shown in Figure 2, our theory of action suggests that students' academic mindsets directly influence their academic behaviors and strategies. For example, research suggests that students who have a growth mindset, who feel a sense of identity and belonging in the school community, and who experience learning as meaningful and valuable are more likely than those who do not have these characteristics to sustain positive academic behaviors (Farrington et al., 2012). They are more likely to go to school regularly, participate in class, and do their homework. They are also more

likely to develop and implement effective learning strategies. As they demonstrate more academic behaviors, they are also more likely to develop and implement effective learning strategies. Similarly, having a sense of identity and community fosters students' engagement, persistence in the face of challenges, and adoption of effective academic behaviors. By contrast, lacking a sense of belonging or experiencing group stigma is associated with increased stress and underperformance (Good & Dweck, 2006; Osterman, 2000). A considerable body of research demonstrates that the underperformance of African-American and other students of color is related to "stereotype threat": students either internalize social stereotypes or are afraid of confirming negative stereotypes about their group through their own actions or language (Aronson, Fried, & Good, 2002; Good, Aronson, & Inzlicht, 2003; Steele & Aronson, 1995). These fears can complicate students' ability to perform well and can undermine their commitment to academic achievement.

Our theory of action also suggests that students' academic behaviors and strategies have positive effects on their academic outcomes. For example, students who attend class, pay attention, participate, and complete homework are more likely than those who do not to earn good grades, accumulate sufficient credits, be promoted on time, and graduate from high school (Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003). Similarly, such students are likely to have better literacy and math skills and greater academic and applied knowledge from their content courses. Learning strategies such as setting learning goals, making plans, monitoring progress, and seeking help may also contribute to academic success, increasing students' ability to engage in course content and thereby to acquire the skills and knowledge they need to succeed in high school and beyond. It's also important to note that

effective learning strategies can have a direct effect on academic outcomes, independent of students' academic mindset.

Although we have described our theory of action as moving progressively from academic mindsets to academic learning and outcomes, we strongly believe that the entire process is recursive. Our theory of action suggests that the academic success experienced by students who embrace a positive academic mindset and demonstrate academic behaviors and learning strategies reinforces their grit and growth, sense of identity and community, and passion and purpose. As a result, we hypothesize that they will continue to exhibit academic behaviors and use effective learning strategies in pursuit of continued positive outcomes. In other words, success breeds success.

This process does not occur in a vacuum. All of the components of this theory of action can be influenced by students' home, school, and community contexts. For example, students in unstable or insecure families have little energy for developing academic behaviors. Ineffective instruction by underprepared teachers can undermine students' belief that their effort can pay off with improved performance. Peers can reward negative rather than positive behavior. Dangerous neighborhoods can discourage attendance and distract students from learning. Some researchers have suggested that the success of interventions designed to improve mindsets may depend on students' contexts.

SECTION II: Important Trends in Practices Targeting Academic Mindsets

Researchers and practitioners have explored and implemented a number of tools and practices to improve academic outcomes by changing student mindsets and thereby improving students' academic behaviors. Previous research also examines tools and practices targeting some of the key learning strategies within our theory of action. We classify these tools and practices into several categories:

- A. Instruction that teaches students that intelligence grows with effort
- B. Shifting students' explanations for academic and social challenges from stable internal causes to temporary external causes
- C. Affirmation and visualization exercises
- D. Exercises that help students relate coursework to their lives
- E. Progress monitoring and support interventions
- F. Support to improve students' learning strategies
- G. Programs that integrate content-specific instruction with mindset development
- H. Approaches that have not yet been codified into tools and practices¹

This section describes practices that fall under each of these areas along with the evidence of their effectiveness. These tools and practices are also summarized in the Appendix to this report. For each intervention, we note the type(s) of mindset it appears to address—grit and growth, identity and community, or passion and purpose—and the related learning strategies and academic behaviors it fosters. In many cases, the practices address more than one domain.

We also note the population of students with whom the intervention has been studied. Much of the research on promising practices to build academic mindsets and learning strategies focuses on groups *other than* low-income students and students of color in middle and high school. Whether interventions shown to be helpful in, say, universities or middle-class elementary schools can also work in underperforming middle and high schools often situated in low-income urban communities cannot be known without actually studying the tools and approaches in those contexts.

A. Instruction That Teaches Students That Intelligence Grows with Effort

Much of the research in this field is (explicitly or implicitly) based on the hypothesis that, when students feel that their academic abilities are fixed, they are less likely to be motivated to persist at tasks or to take on new academic challenges. Instead, they are likely to focus on others' perceptions of their abilities and trying to avoid "failing" in front of others. By contrast, when students believe that their intelligence "grows like a muscle" over time as they put in effort, they are more likely to work hard and have positive outcomes. They also are less worried about struggling with challenging material in front of their peers and teachers. We found four interventions that have demonstrated some success in teaching a growth mindset: two workshops, a mentoring program, and a pen pal program. Some are computer-based and some curriculum-based. The evidence on these four interventions

¹ In many areas of mindset research, the evidence points to approaches that support positive development, such as creating classroom environments that facilitate a growth mindset and organizational structures that foster a sense of identity and community. Though these approaches have not yet been developed into tools and practices, the field should consider them as it moves toward selecting strategies on which to focus.

indicates that tools and practices that teach students that intelligence is malleable can improve students' academic mindset and affect academic achievement.

1) WORKSHOP ON BRAIN MALLEABILITY

One workshop, studied by Blackwell, Trzesniewski, and Dweck (2007), focused on teaching low-income, low-achieving seventh grade students that their brains are malleable and that intelligence is not static. The workshop, which was held over eight sessions, began by teaching the basic anatomy of the brain. Students then read an age-appropriate article about the malleability of intelligence. To combat race and gender stereotypes, the workshop also included a lesson on the problems of stereotyping oneself and others. Finally, students had a series of discussions that taught them that their brains grow smarter in the course of learning by creating new neural connections and strengthening old ones.

A randomized controlled trial found that the workshop had modest positive effects on students' academic outcomes. At the end of one year, the grade point averages of students in the treatment group were 0.3 points higher than those of control group students.

2) COMPUTER-BASED BRAIN MALLEABILITY WORKSHOP

Brainology is an interactive computer-based growth mindset workshop. Students follow animated characters through a series of instructional units that teach them that the brain grows like a muscle. Two and a half hours of online instruction are divided into an introduction and four instructional units, each with review exercises at the end. The program also provides up to ten hours of additional classroom activities. While going through the program, students are prompted to record reflections about what they are learning in an e-journal.

Unpublished studies of Brainology suggest that it improves students' academic outcomes. In a study in Scotland, students were randomly assigned to receive the Brainology curriculum for six weeks or to complete pre- and post-program surveys without receiving instruction. The treatment group showed significant increases in reading achievement test scores—eight percentile points relative to the control group—and more persistence in the face of setbacks (Paunesku, Goldman, & Dweck, n. d.). In addition, a random assignment study of Latino middle school students in California found that Brainology led to a 0.21 increase in grade point average and to improved behavior (Romero, Paunesku, & Dweck, n. d.).

3) MENTORING FOCUSED ON BRAIN MALLEABILITY AND PERSISTENCE

In another intervention, college mentors taught seventh grade students about the malleability of intelligence. The mentors were trained in a three-hour mentoring curriculum provided by their university. As part of the curriculum, they were taught to convey that the brain is malleable and that, though academic difficulties are common for seventh grade students, these problems tend to subside over time. The mentors delivered these messages in two 90-minute sessions near the beginning of the school year. Following the sessions, the mentors helped the students to create web-based public service announcements conveying the messages taught. This intervention thus required students to restate the messages themselves, thus helping them to internalize the information.

Good, Aronson, & Inzlicht (2003) conducted a randomized controlled trial to measure the effect of this intervention on academic achievement. One group of seventh graders received a message on the incremental theory of intelligence (i.e., about the expandable nature of intellectual ability). Another group received an "attribution message;" in other words, they learned about the

tendency for all students to experience difficulty during seventh grade. A third group received a combination of the first two messages, and a fourth group, serving as the control condition, received messages about the perils of drug use. By the end of the school year, students who received messages on the incremental theory of intelligence and students who received attribution messages scored significantly higher on state assessments than did control students. The effect sizes (ES) were 0.52 and 0.71² respectively, indicative of large and statistically significant gains³.

4) PEN PALS

Another intervention that facilitated a growth mindset involved a pen pal activity. Students entering Stanford University were told that they would be involved in the long-distance mentoring of young students from an impoverished community. They were told that they should write letters offering encouragement to the younger students. As part of the intervention, students were shown film clips about how the brain grows like a muscle.

The findings of a randomized controlled trial by Aronson, Fried, and Good (2002) showed that the pen pals intervention had positive effects on the attitudes and outcomes of the university students. After just three sessions of advocating the malleability of intelligence, the treatment created an enduring and beneficial change in African-American students' views of intelligence and attitudes toward academics. Compared to their counterparts in the control group, both African-American and white students earned higher grades and reported enjoying and valuing academics more. The average GPA for African-American students in the intervention group was 3.32, compared to 3.05 in

the control group; for white students, the average GPA in the treatment group was 3.55, compared to 3.34 in the control group (Aronson et al., 2002). Though surveys indicated that the students still perceived the negative messages associated with stereotypes, the intervention changed their academically relevant responses to these threats.

B. Shifting Students' Explanations for Academic and Social Challenges from Stable Internal Causes to Temporary External Causes

A second category of tools and practices involves instructing students on the causes of academic and social challenges. An important dimension of a growth mindset is the ability to attribute academic challenges or "bumps in the road" to external factors rather than to one's own level of intelligence or ability. When faced with new academic challenges, students may become so anxious and overwhelmed that they give up or blame themselves, attributing their challenges to their own lack of ability. African-American, Latino, and other students of color entering challenging academic contexts in which there are few other students from similar racial/ethnic groups may wonder if they belong and become more vulnerable to stereotype threat. These questions can undermine students' *grit and growth* as well as their *identity and community*, thereby reducing their levels of effort and persistence. Some interventions address these negative cycles of self-blame and doubt by instructing or coaching students to reattribute the reasons for academic and social challenges from internal causes, such as their lack of intelligence or belonging, to external causes. These interventions affirm high expectations and assure students that they can

² Effect size is a metric designed to reflect the size of an estimated program effect on a particular outcome relative to the amount of variation in that outcome among the target population. It is calculated by dividing the measured effect of the program on the outcome in question by the standard deviation of that outcome (Cohen, 1998). Interpreting effect sizes is largely dependent on the variables of interest and context of the study. There is no absolute standard for the interpretation of effect sizes. However, in studies of focusing on academic achievement, an effect size of below 0.2 is commonly interpreted as a small or modest effect.

³ Interestingly, the effect of giving both messages was smaller (though not insubstantial) and not statistically significant. This finding could suggest that merging the two messages dilutes the effect, or it could suggest limitations in the design of the study.

achieve. All of these interventions were tested on college students, so how they could be adapted to the needs of high-risk middle and high school students remains to be seen.

1) ATTRIBUTION INTERVENTION

This intervention focused on shifting the ways college freshmen conceptualized academic setbacks. Students were taught that most college freshmen face challenges and experience academic difficulties in their first year, but that these difficulties tend to decrease in the second year because they are related to the transition from high school to college—that is, they have an external cause. Participants saw transcripts revealing that most freshmen’s grades improve after the first year and viewed videotapes of upperclassmen discussing their college experiences. This strategy aimed to help students “de-personalize” their challenges and see them as a normal part of the college transition.

Wilson and Linville’s (1985) study of this approach found that, one week after the intervention, students in the treatment group performed better than students in the control group on the GRE exam ($ES = 0.45$). In addition, students in the treatment group earned higher GPAs and were 80 percent less likely than non-intervention participants to drop out of college. Further, the effects of this intervention seemed to gain strength with each term of college.

2) ADDRESSING “BELONGING UNCERTAINTY”

An intervention designed to address “belonging uncertainty”—the belief that “people like me don’t belong here”—involved giving students of color alternative explanations for their challenges in college, helping them to internalize the message that anxieties about belonging are common. College freshmen saw survey data revealing that upperclassmen of all racial/ethnic groups worried about social acceptance in their first year of college. Participants also learned that students’

anxieties about belonging decreased over time. To internalize this message, students wrote an essay and gave a speech for future freshmen about how anxieties about belonging decrease over time (Walton & Cohen, 2007, 2011).

In a randomized controlled trial, African-American students in the treatment group earned higher grade point averages in their sophomore through senior years compared to those who did not receive the intervention, reducing the racial achievement gap in grade point averages by 52 percent. Further, participants were more likely than non-participants to be in the top 25 percent of their college class (Walton & Cohen, 2007).

3) “WISE” CRITICAL FEEDBACK

In a set of two experiments, researchers tested whether adding an explanation that a student was being held to a high standard—which he or she could achieve—could mitigate stereotype threat when the student received critical feedback on a writing assignment (Cohen, Steele, & Ross, 1999). African-American college students were asked to write letters of recommendation for their favorite teachers. The letters were returned with critical feedback. In the treatment groups, the critical feedback was accompanied in both experiments by an invocation of high standards and an assurance that the student could meet those standards. In the first experiment, control students received praise on their performance intended to buffer the critical feedback, while in the second experiment control students received an invocation of high standards alone (without assurance that they could meet those standards).

Invoking high standards while delivering assurance that students were capable of meeting those standards led African-American students to report less bias on the part of the reviewer, greater motivation for the task, and greater willingness to consider a career that involves writing. The results of the second experiment also showed that

invoking high standards alone reduced reports of reviewer bias attributions but did not affect task motivation (Cohen et al., 1999).

C. Affirmation and Visualization Exercises

A third category of tools includes affirmation and visualization exercises addressing multiple domains of academic mindset. Some emphasize intrinsic motivation and other student attitudes related to *identity and community* and *passion and purpose*. Others emphasize *grit and growth* in that they focus on the payoffs for effort and persistence. The evidence suggests that these tools have positive effects on students' academic behavior, including attendance, participation, and homework completion, and on such academic outcomes as grades. Both of the interventions described below were tested with middle or high school students, though not necessarily in under-resourced or under-performing schools.

1) VALUES ESSAY

Earlier sections of this review describe literature that discusses how stereotype threat or fears of confirming negative stereotypes can undermine growth mindset and academic performance among students of color. A "values essay" is one affirmation exercise that addresses this issue (Cohen, Garcia, Apfel, & Master, 2006). Participating seventh grade students wrote a values essay that took approximately 15 minutes to complete. First they were guided through an independent writing exercise that presented them with a list of values, such as relationships with friends and family or being good at art. Then they were asked to write about the value that was most important to them. In studies replicating this intervention, students wrote about three values that were important to them.

A randomized controlled trial (Cohen et al., 2006) found that the values exercise led to a positive recursive cycle: The intervention reduced perceptions of threat, leading to small performance

increases, which, in turn, further reduced perceptions of threat and led to long-term gains in performance. At the end of the first semester after the intervention, African-American students' grades increased, reducing the gap in GPAs between African-American and white students by 40 percent. The effects extended for two years, through the end of middle school, and were observed in three different cohorts of students. The study was replicated in 2011 with similar positive results showing a continued positive effect over two years (Cook et al., 2012).

Importantly, this intervention has been tested only in predominately functional middle-class schools. Lead author Cohen indicated that the intervention was not designed for dysfunctional schools; he did not believe it would work in settings where students do not have adequate opportunities to learn (personal communication, June 8, 2012). Other attempts to replicate the study have not found positive effects (Borman, personal communication, May 16, 2012). One possibility is that the control condition in the original experiment affected the results. Control group students wrote about a value that would be important to *someone else*. Writing these essays could have stimulated stereotype threat and anxiety about belonging, which could have lowered control group outcomes.

In work funded by the Raikes Foundation, Cohen, Dweck, and Walton are jointly implementing the values essay, growth mindset, and belonging uncertainty interventions described above in what they call the "Super Intervention" (Hong, personal communication, May 11, 2012). The researchers hypothesize that the combined interventions may have a stronger effect than any single intervention. Also, if one intervention does not reach a particular student, another intervention may. The interventions will be implemented at the beginning of the school year, spaced about one month apart. Implementation will begin in fall 2012; thus, results are not yet available.

2) “POSSIBLE SELVES” EXERCISE

This intervention focused on helping students of color believe that they could achieve future academic success and build positive “possible selves” (Oyserman, Bybee, & Terry, 2006). It sought to inoculate students against interpreting setbacks as failure. A series of 11 workshop sessions focused on teaching students to use self-regulatory strategies to persist through difficulty rather than giving up in the face of challenges. In sessions 1–4, students clarified their positive possible selves, imagined themselves as adults, drew pictures of positive and negative forces that helped or hindered their progress, and created timelines for reaching their goals. In sessions 5–7, students created action goals and developed strategies to attain them. Sessions 8–11 involved developing problem-solving strategies, addressing the process of getting to high school graduation, and cementing students’ new metacognitive interpretations of events.

A randomized controlled trial (Oyserman et al., 2006) found that the intervention helped middle school students improve their behavioral self-regulation (e.g., self control and delayed gratification). As a result, students were more likely to attend and participate in class and to spend more time on homework. Self-regulation improved academic outcomes and students’ mental health as well. Two years after the intervention, students who had participated in the workshop had substantially higher test scores ($ES=0.36$), higher GPAs (1.64 vs. 1.36), fewer incidents of disruptive behavior, and fewer depressive symptoms than students in the control group. Treatment group students were 60 percent less likely than control group students to repeat eighth grade (Oyserman et al., 2006).

D. Exercises That Relate Course Material to Students’ Lives

Our scan of existing research found that few specific tools have been developed to increase students’ *passion and purpose*. We identified one promising practice, aimed at high school students in science classes, that aimed to increase student engagement through a simple writing exercise (Hulleman & Harackiewicz, 2009). Students were asked to write essays that related what they were learning in class to their own lives. The idea was that relating the material to their lives would make it more personally relevant to students, thereby increasing their engagement in the class. The intervention lasted for one semester, with students writing between one and eight essays.

In a randomized controlled trial (Hulleman & Harackiewicz, 2009), the treatment group participated in the exercise, while a control group of students simply wrote about the topics covered in class, without being asked to connect the material to their lives. Despite the relative simplicity of the exercise, the study found that the intervention increased interest in science and course grades for students who initially reported low expectations of success in science. These students’ grades increased by almost two-thirds of a letter grade compared to those of students in the control group. The intervention did not have any statistically significant effects on students who had reported high expectations for success prior to the intervention.

E. Tools Designed to Improve Student Learning Strategies

Although developing academic mindsets has been shown to significantly improve students’ academic performance, learning strategies are an important mediating factor between mindset and student

outcomes. Students who have academic mindsets that encourage positive academic behaviors may still perform below their potential (Dweck, Walton, & Cohen, 2011). They need to master the learning strategies that enable them to complete academic tasks successfully. Developing these learning strategies can lead both to positive academic outcomes and to experiences that build the beliefs, for example, that ability is malleable and that effort pays off—the attitudes that comprise academic mindsets.

According to the theory of action in Figure 2, several specific learning strategies reinforce key beliefs and mediate between academic mindsets and student outcomes: study skills, time-management skills, a goal-setting orientation, help-seeking behaviors, metacognitive strategies, and self-regulated learning. While most of these concepts are straightforward, the latter two merit definition.

Metacognition can be defined as “thinking about one’s own thinking.” It can be broken down into two distinct but interrelated areas:

- Metacognitive knowledge: awareness of one’s thinking
- Metacognitive regulation: the ability to manage one’s thinking processes (Darling-Hammond, Austin, Cheung, & Martin, n.d.)

Self-regulated learning refers to students’ intentional use of strategies to achieve learning outcomes (Zimmerman, 2001). Self-regulated learning is multifaceted and includes:

- Cognitive strategies: repetition, organizing new material, summarizing meaning, guessing meaning from context
- Metacognitive strategies: planning, monitoring, regulating

- Resource-oriented strategies: attention, motivation, concentration (Farrington et al., 2012).

Together metacognition and self-regulated learning comprise a set of learner-directed strategies, processes, and study skills that have been shown to improve academic performance (Farrington et al., 2012).

Knowing metacognitive and self-regulation strategies, and understanding how and when to use them, are associated with learning and academic success (Paris & Oka, 1986; Pintrich & De Groot, 1990; Pokay & Blumenfeld, 1990). Considerable evidence suggests that students learn more when they have better metacognitive strategies and use them to facilitate and regulate their learning (Farrington et al., 2012).⁴ Self-regulation and metacognition are not personal traits that individual students either possess or lack. Rather, both can be learned—and must be learned, if students are to succeed academically (Darling-Hammond et al., n. d.).

Some learning strategy interventions target metacognition, while others focus on goal setting and self-regulation. These interventions often include components aimed at directly developing or modifying students’ academic mindsets. Still other interventions in this domain focus on specific study skills.

1) SELECT, ORGANIZE, ASSOCIATE, RELATE (SOAR) STUDY SKILLS PROGRAM

SOAR teaches new study skills and maximizes students’ existing skills for enhanced academic success and self-confidence (Jairam & Kiewra, 2009). SOAR skills can be used for any academic subject. Students learn skills related to each of the four “SOAR” behaviors. Selection focuses on complete note taking. Organization teaches use of graphic organizers. Association helps students

⁴ Although research has shown that use of learning strategies is associated with improved academic performance, most studies of learning strategy use are cross-sectional (not longitudinal), making it difficult to link strategy use directly with subsequent academic performance. Additionally, there are no widely accepted assessments or measures of self-regulated learning or use of metacognitive strategies, so most studies rely on student self-report measures. Moreover, most studies are correlational rather than causal, which makes it difficult to assess the true effect of learning strategy use on academic performance.

build new knowledge on what they already know. Regulation helps students test their mastery of new material. Students learn these behaviors in small groups, using their actual assigned class materials. The SOAR curriculum is a series of 10–20 minute lessons using the following steps:

- Identify organizational or learning problems and explore why they exist
- Present solutions and the principles that make them work
- Immediately apply the solutions to students' lives and school work
- Encourage regular reflection and review with an eye toward identifying necessary modifications.

SOAR has traditionally focused on helping struggling students with about a C average. However, it can be used by any student who wishes to improve his or her study skills and grades. Though it was developed for use by college undergraduates, it has been used in middle and high school classrooms as well. A recent study showed that college undergraduates using SOAR scored significantly better on two different types of tests than did students who used such traditional study methods as reading over notes and highlighting texts (Jairam & Kiewra, 2009).

2) BRAINWARE

Brainware is a comprehensive educational software program that aims to enhance the academic performance and study skills of elementary and middle school students. The software, used three to five times per week for 30–60 minutes per session, develops skills in six domains: attention, memory, visual processing, auditory processing, thinking, and sensory integration (Helms & Sawtelle, 2007). The development of these skills leads to greater ability to handle academic and personal challenges, teaching students new and creative ways to solve problems.

A pre-post comparison study of Brainware showed that its use led to significant gains in GPA and in tests of cognition and achievement among elementary-aged children with learning disabilities in suburban schools (Helms & Sawtelle, 2007). An interesting feature of the program is that it is available for purchase by parents as well as teachers, making it a viable supplement to classroom activities.

3) MENTAL CONTRASTING/IMPLEMENTATION INTENTIONS (MCII) WRITING EXERCISE

MCII uses a set of writing exercises to improve self-regulation and increase students' level of academic effort (Duckworth et al., 2011). High school students were randomly assigned to participate in a writing exercise intended to increase commitment to achieving an academic goal: completing PSAT practice tests. During an English class in May, students received writing packets prompting them to write about how likely they were to complete the PSAT workbooks they would receive in July and how important it was to do so. Both treatment and control groups also wrote two positive outcomes of finishing all the practice tests (e.g., "I'll feel good about myself") and two obstacles that could prevent them from doing so (e.g., "I'm too busy"). After these tasks, control group members wrote short essays about an influential person or event in their lives. Treatment group members wrote essays centered on completing the PSAT practice tests, designed to prompt mental contrasting (i.e., contrasting the idea of a desired future with possible obstacles) and the formation of implementation intentions (i.e., advance planning for how to overcome potential obstacles) centered on completing the PSAT practice tests. They rewrote the positive outcomes they had previously stated and elaborated on them as vividly as possible. They also defined two plans to overcome each of the two obstacles they had identified.

Students' PSAT workbooks were collected in October, after students had taken the exam. Students in the treatment group averaged 140 completed practice questions, compared to 84 questions in the control group, a statistically significant difference (Duckworth et al., 2011). The results indicate that the MCII intervention can be an effective self-regulation strategy for adolescents. Though this finding suggests that MCII or similar tactics might improve learning strategies, we found no studies examining the relationship between MCII and academic outcomes.

4) ONLINE GOAL-SETTING PROGRAM

Academically struggling students at a Canadian university participated in a formalized goal-setting program intended to improve academic performance (Morisano et al., 2010). Eighty-five students were randomly assigned to treatment and control groups. The treatment group participated in an intensive web-based goal-setting program that lasted approximately two and a half hours. The program's eight steps focused on writing exercises related to students' desired futures, specific goals related to those futures, plans for achieving those goals, and commitment to achieving them. The intervention led to higher post-intervention GPAs (2.91 vs. 2.46), higher levels of credit accumulation (0 percent of treatment students vs. 20 percent of control group students dropping below nine credits), and reductions in self-reported negative feelings and beliefs ($ES = 0.46$) (Morisano et al., 2010).

5) THINKERTOOLS INQUIRY CURRICULUM

ThinkerTools is a software and curriculum bundle that helps students understand physics concepts by facilitating the development of metacognitive skills and teaching the processes of scientific inquiry. The curriculum focuses on enabling students to develop the expertise needed to carry out and understand the purpose of the steps in the learning process, as well as to monitor and reflect on their progress as they conduct their research (White & Frederiksen,

2001). The intervention includes "reflective assessment," in which students evaluate their own and each other's research using criteria that characterize expert scientific inquiry. By reflecting on the attributes of each activity and its function in constructing scientific theories, the program developers hope students grow to understand the nature of inquiry and the habits of thought that are involved.

White and Frederiksen (1998, 2001) used tests on scientific inquiry and on physics to compare middle-school students (grades 7–9) taught using the ThinkerTools curriculum to high school students taught using the usual physics curriculum. The researchers also compared students who learned with the full ThinkerTools curriculum, including reflective assessment, to students who had ThinkerTools without reflective assessment. ThinkerTools middle school students performed better than the high school students on both the inquiry and the physics assessments. Students who completed the reflective assessments performed better on both tests than students who did not (White & Frederiksen, 2001). The study does not specify whether the results are statistically significant.

6) STUDENT SUCCESS SKILLS

SSS is a structured large- and small-group intervention for students in grades 5–9 that targets the cognitive, social, and self-management skills that research suggests can improve academic achievement (Brigman, Webb, & Campbell, 2007). The large group sessions focus on five key areas: 1) goal setting and progress monitoring; 2) building a community of caring, support, and encouragement; 3) cognitive and memory skills; 4) handling pressure and anxiety; and 5) building healthy optimism. The small-group sessions, intended for students who need extra support, focus on the five key areas with additional emphasis on a social problem-solving model that includes peer coaching.

Several studies of the SSS program (Brigman & Campbell, 2003; Brigman et al., 2007; Campbell & Brigman, 2005) have shown statistically significant differences between treatment and control students in reading and math achievement as measured by the Florida Comprehensive Assessment Test. Effect sizes in reading ranged from 0.11 to 0.25, while effect sizes in math ranged from 0.36 to 0.51.

7) READING APPRENTICESHIP

RA is a content-specific intervention that addresses metacognition and the development of learning strategies. This model is designed to improve literacy skills and academic achievement among struggling readers by drawing on four dimensions of classroom life: social, personal, cognitive, and knowledge-building. These four interacting areas of classroom life are woven into subject-area teaching through a “metacognitive conversation” about the thinking processes in which teachers and students engage as they read (Greenleaf & Schoenbach, 2001). In RA, teachers and students work together to make sense of texts by engaging in conversation about what constitutes reading in specific academic disciplines, and the strategies required to do it. This interactive metacognitive conversation is carried on both internally, as teacher and students reflect on their own mental processes, and externally, as they share their reading processes, strategies, knowledge resources, motivations, and interactions with and affective responses to texts. Teachers implement RA while teaching subject-area content, rather than as an instructional add-on or additional curriculum.

A random assignment study (Greenleaf et al., 2011) on the use of RA in high school biology classes showed that students in the RA treatment group performed better than students in the control group on state standardized assessments in English language arts, reading comprehension, and biology. The effect sizes for these tests were 0.23, 0.24, and 0.28 respectively.

F. Progress Monitoring and Support

One type of strategy associated with improving academic behaviors has emerged in the context of dropout prevention: providing students with close monitoring and support. These strategies provide direct support for the academic behaviors associated with improved student outcomes. These strategies are characterized by the quick identification of students who begin to show signs of disengaging from school, followed by personalized support that takes the student’s life circumstances into account. Although these interventions do not always focus directly on academic mindsets, they still merit discussion. First, to the extent that these interventions positively affect academic behavior, they can stimulate the previously mentioned recursive processes related to academic mindsets and learning strategies. Second, these interventions often include elements that directly support key dimensions of academic mindsets.

1) ACHIEVEMENT FOR LATINOS THROUGH ACADEMIC SUCCESS

ALAS (the acronym means *wings* in Spanish) seeks to raise academic achievement and reduce underperformance and dropout rates for middle and high school students. It includes 1) ten weeks of problem-solving instruction along with two years of follow-up problem solving, prompting, and counseling; 2) recognition and bonding activities; 3) intense attendance monitoring; 4) frequent teacher feedback to parents and students; 5) training for parents on problem solving with their children, as well as on how to participate in school activities; and 6) assistance with connecting to available community services. ALAS students have a success coach who monitors their performance and works with other teachers, their families, and others in the community. Students attend a daily, year-long class taught by the success coach that is designed to increase resilience by teaching

problem-solving and self-control skills while fostering a positive attitude.

Rigorous studies show that ALAS has positive effects on students' academic behavior, attendance, and progress through school. A random assignment study (Larson & Rumberger, 1995) documented the effects of ALAS for 94 learning-disabled and high-risk students of Mexican descent, grades 7–9 at a school in a predominantly Latino community in Los Angeles County. ALAS reduced excessive absenteeism (defined as being absent for 25 percent of school days or more) among both special education and high-risk students. Among high-risk students, 15 percent of treatment group members displayed excessive absenteeism, compared to 38 percent for the control group. ALAS also had positive effects on enrollment status and the percentage of students who were on track to graduate. Based on the results of Larson and Rumberger's work, the What Works Clearinghouse (WWC) of the Institute of Education Sciences (IES) determined that ALAS has potentially positive effects on students staying in and progressing through school (WWC, 2006).

2) CHECK & CONNECT

Check & Connect is an intervention designed to increase student engagement in school, with the ultimate goal of school completion. Students are assigned a mentor to work with them for at least two years. Because of the long time commitment, mentors develop strong bonds with students and understand their family circumstances. The mentor uses school data to regularly monitor student performance in areas such as attendance, grades, and behavior referrals. If a student begins to show signs of becoming disengaged from school by, for example, missing more classes, the mentor steps in to provide targeted, personalized interventions tailored to the individual student. Mentors also work with parents and schools to build constructive relationships.

Research has shown that Check & Connect has positive effects on attendance, homework

completion, and progress through school. A 1998 random assignment study among students in grades 7–9 found that Check & Connect had a positive effect on attendance: 85 percent of treatment group students had consistent attendance patterns, compared to 64 percent in the control group (Sinclair et al., 1998). This study also found the program to have a positive effect on homework completion, school engagement, credit accumulation, and enrollment. Based on these and other studies (e.g., Sinclair, Christenson, & Thurlow, 2005), the WWC determined that Check & Connect has positive effects on students staying in school and potentially positive effects on students progressing in school (WWC, 2011). However, the program has not shown effects on high school graduation rates or academic achievement. An important limitation of the evidence is that almost all completed studies of Check & Connect have been conducted among special education students.

3) MARVUL TRUANCY INTERVENTION

This recently developed intervention is aimed at reducing absenteeism among high school students through a five-month program that includes attendance monitoring, sports participation, and a class to build moral character. The attendance monitoring component consisted of telephone calls to students' homes early each morning. Parents learned not only of behavior associated with disengagement from school (e.g., absences, skipping class, other unacceptable behaviors), but also of their children's positive school accomplishments. The purpose of the calls was to monitor attendance as well as to communicate to families that the school wanted students to succeed. The sports participation component involved students participating in either flag football or basketball, with teams practicing regularly after school. The moral character class involved students in discussing the differences between right and wrong, keeping journals that recorded their moral dilemmas, making short classroom presentations on moral issues, and discussing situations involving moral or ethical concerns (Marvul, 2012).

A random assignment study of 40 male students at an inner-city alternative high school for at-risk students found that the program reduced absenteeism and increased students' educational expectations and engagement (Marvul, 2012).

4) ADVANCEMENT VIA INDIVIDUAL DETERMINATION

AVID is designed to increase college enrollment among groups that are historically underrepresented in four-year colleges. The AVID program targets middle-achieving students. Additional screening identifies students who are likely to succeed in the program due to factors such as motivation and parent commitment. In secondary schools (grades 7–12), AVID students take a daily AVID elective class in which they learn organizational and study skills, get academic support, and participate in activities designed to help them see that they can attend college. College students serve as tutors in the AVID elective. AVID students are generally required to enroll in an honors or Advanced Placement class. An AVID teacher-coordinator organizes the curriculum and activities, works with school administrators, and advocates for the program and AVID students.

A tremendous number of studies have looked at the effect of AVID on various outcomes, including standardized test scores, attendance, grades, and college enrollment. However, these studies are generally descriptive and do not rigorously establish the impact of AVID on outcomes (Black et al., 2008). One exception is a quasi-experimental study of 96 high school students in a Colorado school district (Rorie, 2007). This retrospective study matched high school graduates who had AVID-trained teachers for the majority of their classes to graduates of the same schools who did not take the AVID class. The study found no statistically significant differences between the two groups in ninth and tenth grade reading test

scores. Finding this study to be the only one among 66 studies reviewed that met its criteria for evidence of effectiveness, the WWC describes AVID as having no discernible effects on adolescents' reading comprehension, the only topic area for which it has evaluated the program (WWC, 2010).

Other studies have associated AVID with positive effects on standardized test performance, attendance, grades, enrollment in advanced courses, and college enrollment and acceptance rates (Black et al., 2008). However, studies also report that students may not realize the full benefits of AVID until they have been in the program for at least three years (Mehan et al., 1992; Mehan, Hubbard, & Villanueva, 1994; Oswald, 2002).

G. Programs That Integrate Content-Specific Instruction with Mindset Development

In contrast to most of the tools and practices profiled in this review, which are delivered independently from content, some programs integrate content-specific instruction, such as mathematics or reading, into their efforts to develop academic mindsets. These programs aim to teach students about the malleability of the brain and foster learning strategies, such as self-regulation skills, while at the same time giving students opportunities to use these new skills and attitudes in a specific academic context. The integration of content with mindset development allows students to practice and reflect on their experiences as they build content knowledge. Programs that integrate mindset development with content instruction, such as Reading Apprenticeship⁵ and Academic Youth Development, project a consistent message about academic mindset while giving students opportunities to enact that message in class.

⁵Reading Apprenticeship arguably fits in both categories: practices focused on learning strategies and practices that integrate content instruction with mindset development. Its explicit focus on metacognition led us to place it in the learning strategies section.

1) ACADEMIC YOUTH DEVELOPMENT

AYD, at the Charles A. Dana Center at the University of Texas at Austin, simultaneously teaches mathematical knowledge and psychological strategies for developing a positive mindset (Charles A. Dana Center, 2009). AYD is delivered in two modes: as a summer program and as a year-long advisory or afterschool program. The summer program, focused on entering ninth graders, addresses the anxieties of the transition to high school and the thought processes associated with achievement. The three-week intensive program meets for four hours a day and uses interactive applied mathematical problems, while also teaching students psychological strategies. Approximately half the day focuses on algebra, while the other half focuses on mindset development. The advisory or afterschool version of the program is conducted twice a week throughout the school year with eighth, ninth, and tenth graders. The program focuses on science, technology, engineering, and math (STEM) content (not just algebra) and on metacognition, the effect of effort, the malleability of intelligence, positive ways to tackle challenges, and motivation.

Results of a pre/post student survey administered at the beginning and end of the AYD summer program indicated positive shifts in students' attitudes and beliefs about the malleability of intelligence (ES=0.12 to 0.14), persistence (ES=0.02 to 0.04), sense of belonging (ES=0.05 to 0.06), and problem solving (ES=0.03 through 0.04) (Bush-Richards et al., 2011). These effects were not large, and it is not clear how they translate into academic outcomes. Research on the effects of the school-year version of the program has not yet been conducted.

2) SELF-REGULATED LEARNING

SRL is a semester-long classroom intervention intended to improve academic performance in math among at-risk undergraduate students (Zimmerman et al., 2011). The SRL classroom components lead students to reflect on their work

and learn from their mistakes, developing new learning strategies in the process. For example, teachers encourage students to go to the board to demonstrate problem-solving and error-detection strategies and to verbalize those strategies while working through practice problems. Teachers are trained in SRL via initial meetings prior to the beginning of the semester and weekly follow-up meetings to review implementation.

A randomized controlled trial of SRL found positive effects on academic performance. The study involved six developmental math courses and 12 introductory college-level math courses in a single 15-week semester. Students in both the developmental and introductory SRL courses performed better on regular course exams (ES=0.29 to 0.55) and the final exam (ES=0.47 to 0.50) than did students in control classrooms. Further, a higher proportion of students in SRL classrooms than those in conventional classrooms passed the course: 68 percent vs. 49 percent for the developmental course and 76 percent vs. 62 percent for the introductory course. Sixty-four percent of students in the developmental SRL courses, as compared to 39 percent of students in conventional classrooms, passed a subsequent required college entrance exam (Zimmerman et al., 2011).

3) CONCEPT-ORIENTED READING INSTRUCTION

CORI is a classroom-level intervention aimed at increasing reading comprehension and engagement among elementary school students (Guthrie et al., 2004). Based on the theory that reading comprehension is facilitated by reading engagement, it combines support for cognitive strategies in reading with support for motivation. In CORI classrooms, teachers use five practices that motivate and support students in their use of complex strategies for comprehension: reading for a purpose, choices and control, hands-on activities, interesting texts, and collaborative or social learning. The five practices are combined with explicit instruction in six reading comprehension

strategies, referred to as cognitive supports:

- 1) activating background knowledge;
- 2) questioning; 3) searching for information;
- 4) summarizing; 5) organizing graphically; and,
- 6) identifying story structure. The strategies are taught individually and then integrated, allowing students to practice them in complex comprehension exercises. Teachers model the strategies, scaffold instruction, and provide guided practice to students around the strategies.

Two studies tested whether CORI's combination of motivation and cognitive support benefitted students more than strategic instruction (SI), which provides only cognitive support (Guthrie et al., 2004).

The first study was implemented in third-grade classrooms in four schools in a small mid-Atlantic city. Two schools were randomly assigned to implement CORI and two to implement SI. Both the CORI and SI programs were implemented for 12 weeks for 90 minutes daily. CORI teachers participated in a 10-day workshop over the summer to prepare them for implementing CORI. SI teachers attended a five-day workshop. Students in CORI classrooms were found to perform far better than did SI students on several dimensions of reading achievement, including multiple text comprehension (ES=1.01), passage comprehension (ES=1.32), comprehension strategy (ES=1.23) and reading motivation (ES=0.98) (Guthrie et al., 2004).

The second study was similar, except that it included a third group that received traditional instruction (TI). Students in CORI classrooms performed better than students in traditional classrooms on a passage comprehension test (ES=2.75), and they performed better than both SI and traditional students on a reading comprehension test (ES=0.71 vs. TI; ES=1.4 vs. SI). Teachers rated CORI students higher on intrinsic and extrinsic motivation than SI teachers rated their students (ES=1.23, 1.29, and 1.28, respectively).⁶

The studies do not show whether these effects are sustained over time or how they translate into differences in academic literacy as students move into higher grades. It is unclear whether the results are driven by the additional instructional time or by the integration of instruction with components of academic mindset. However, the findings suggest the potential powerful effects of approaches that integrate academic and content support in English language arts.

H. General Approaches That Support Positive Academic Mindsets

In addition to the specific tools and practices that address academic mindsets, research points to a number of other educational approaches that encourage academic mindsets but have not been developed into specific tools.

1) ADDRESSING SCHOOL CULTURE

Work conducted by the Achievement Gap Initiative (AGI) at Harvard University has focused on changing peer cultures that undermine student success. Youth survey data suggest that students comply with social rules that they disapprove of but are afraid to violate (AGI, 2011). AGI's Conspiracy to Succeed is an "open plot to help youth undermine oppressive aspects of their own youth culture that they as individuals feel powerless to alter" (AGI, 2011). A group of "lead conspirators"—student opinion leaders who are not necessarily high academic achievers—are enlisted to implement the effort, supported by teachers, administrators, and parents.

Participating schools survey students about the cultures of achievement that students typically experience—and comply with—and the culture they would establish if they had the power. Results from more than 3,300 students at 18 suburban and urban high schools have shown a gap between the culture that exists in schools and the one students

⁶ These effects sizes are unusually high. However, it is unclear from the evidence how well these effects translate into traditional achievement outcomes as measured by state or nationally normed standardized achievement tests. It can sometimes be the case that instruments that are over-aligned with the intervention can generate estimated program effects that do not generalize to other important outcomes (Slavin, 2008).

would like to have. Findings of a school's baseline student surveys become part of an orientation to the conspiracy idea for lead conspirators and co-conspirators. Participants are also introduced to research-based ideas about adolescent social development and achievement motivation. As a group, conspirators then identify changes they will make in their own behaviors, using the survey data to inform projects geared toward shifting the school culture in a positive direction. Examples of projects include developing and implementing a campaign to encourage respect and teamwork. Another involved developing an honor code to discourage cheating and disrespect. AGI supports students in designing and implementing their projects and provides instruments for monitoring progress. Anecdotal reports indicate that activities are making a positive difference in school cultures (AGI, 2011).

2) HELPING STUDENTS BELIEVE THAT THEIR PERFORMANCE IMPROVES WITH EFFORT

Though many interventions focus on teaching students about the malleability of intelligence, studies find that students need to hear frequently that they can succeed in their academic work, that their work has value, and that their performance improves with effort. Marzano (2000) cites studies showing that students are more likely to believe that success is possible when grading practices are transparent and teachers explain how different assignments affect grades. These studies also underscore the importance of frequent discussions between teachers and students about learning goals and of regular feedback about whether students are achieving those goals (Marzano, 2000). Instructional contexts that support a positive mindset also establish as a classroom norm the belief that all students, not just a select group, can be successful (Carr & Walton, 2011).

3) PRAISING STUDENTS FOR THEIR EFFORTS OR STRATEGY CHOICES RATHER THAN FOR THEIR TALENTS OR ABILITIES

The everyday messages students receive about their academic performance have a clear effect on

their ability to maintain a growth mindset. Studies reveal that praising students for their hard work reinforces students' efforts and the endurance of growth mindset, while praising students for their abilities tends to undermine their efforts and encourages students to withdraw from challenges.

In Dweck's (2007) study, teachers praised fifth-graders as they worked on a task. They praised some students for their intelligence by saying, "You must be smart at these problems." They praised others for their hard work, saying, "You must have worked hard at these problems." Dweck found that, when given a choice of activities, students who had been praised for intelligence chose easy tasks, while students who had been praised for effort chose more difficult tasks. When students who were praised for their intelligence worked on challenging problems, they solved 30 percent fewer problems than those who were praised for hard work, and they asked to do only easy problems from then on. (For a longitudinal study of the effects of teacher praise, see Blackwell, Trzesniewski, & Dweck 2007.)

4) EXTENDING THE TIME THAT STUDENTS REMAIN WITH THE SAME PEERS AND TEACHERS

Structures that aim to influence students' experiences of their schools as communities and have been related to increased identity and sense of community include small schools, block scheduling, departmental teaming, houses, inter-age grouping, and class groupings that continue over consecutive years (Osterman, 2000).

5) INCREASING ENGAGEMENT AND PROMOTING PASSION AND PURPOSE

Research has identified multiple potential approaches that teachers and schools can use to increase student engagement and promote a sense of passion and purpose for learning. Though these approaches have generally not been developed into specific tools or programs, the research suggests that they hold promise for encouraging academic mindsets.

a) Assign challenging but achievable tasks. To be motivated to put forth effort, students must feel that they are capable of doing the work and that the results of their efforts are not predetermined. If students think that they lack the necessary ability to succeed or that the outcome is out of their control, they may not even attempt to complete school assignments or participate in class. One way to help students develop a sense of competence is to give them tasks that are difficult but within their reach. Survey evidence has shown that most high school students do not feel challenged but would prefer to be (MetLife, 2001; Public Agenda, 1997). Challenging work—work that requires higher-order thinking—promotes not only feelings of competence but also students’ enjoyment of classes (National Research Council [NRC], 2004).

b) Set clear and high expectations. Related to the practice of giving students challenging but achievable tasks is the practice of holding students to high standards. A body of non-experimental research suggests that students perform well in schools in which teachers have high expectations (Baker, Terry, Bridger, & Winsor, 1997; Evans, 1997; Lambert & McCombs, 1998; Lee, Bryk, & Smith, 1993; Lee & Smith, 1999), though it cannot confirm a causal relationship. Setting high standards conveys the idea that students are inherently capable of high achievement. This idea can combat feelings of incompetence, to which students from low-income families or from historically disadvantaged racial or ethnic groups such as African-Americans, Latinos, Native Americans, and others are particularly vulnerable. When students do not feel challenged, they may think that their teachers do not believe they can succeed. Rights, Respect, and Responsibility (RRR), a program developed in Canada and used also in the United Kingdom, focuses on explicit recognition of children’s rights and encourages high expectations (Wallberg & Kahn, 2011). Covell (2010) found that RRR increased self-reported

student engagement among 9 to 11 year olds along multiple dimensions, including interpersonal harmony and participation.

c) Make the curriculum relevant. Another way to increase engagement is to make the learning relevant to students. Authentic tasks, for example, require students to apply concepts from school to real-world settings. Work by Lee, Smith, and Croninger (1995) showed that authentic tasks motivated high school students and led to higher achievement than did traditional school assignments. Another way to make schoolwork relevant is to incorporate students’ cultural knowledge by, for example, using materials that address the social issues and concerns with which students identify. For example, Lee (1995a, 1995b, 2001) had students learn literary concepts by analyzing content such as rap lyrics and film clips. Students with low scores on standardized reading tests were motivated in this way to grapple with complex works of literature (NRC, 2004).

d) Give students choices. Some studies argue that choice plays an important role in a student’s desire to engage in academic work, thus facilitating passion and purpose. Several studies suggest that providing students with choices regarding the courses they take, the material they study, and how they complete tasks all result in students being more interested in pursuing academic work (Cordova & Lepper, 1996; NRC, 2004). The kinds of choices provided to students matter as well. Stefanou, Perencevich, DiCintio, and Turner (2004) identified types of autonomy teachers can allow, from basic choices, such as letting students choose where to sit in class, to more cognitive choices, such as giving students the freedom to select problem-solving strategies. Research suggests that giving students cognitive autonomy has long-lasting effects on their engagement and motivation (NRC, 2004).

SECTION III:

Implementation and Scale-Up

Although limitations in the interventions and in the evidence supporting them are apparent, our review suggests that some tools and practices hold promise for addressing student mindsets. Attempts to implement or scale up these interventions, however, require consideration of some important issues.

Limited Scale-Up Evidence

We asked our key informants about the extent to which these interventions are being developed, implemented, and scaled up in schools across the country. Their input, along with our review of the evidence, suggests that many of these tools have been implemented and evaluated primarily in research contexts. There is little evidence about how these interventions have been scaled up in schools (Farrington et al., 2012; Yeager & Walton, 2011). Interventions monitoring student progress are an exception; these have been implemented in large numbers of schools across the country that serve high proportions of low-income students and students of color. However, this class of interventions, in addition to being an exception, does not directly address student academic mindsets. Most of the interventions discussed in this review that directly address key components of student academic mindsets have been implemented in only a few schools. Few have been implemented or studied in middle or high schools serving high proportions of poor students, students of color, and low-achieving students.

Implementation Fidelity

A related concern is that much of the research examining the effects of mindset tools and practices has taken place in relatively controlled settings. In the real world, implementation fidelity is an important consideration. Teachers and other

school staff may not always be willing or able to follow the protocols used in experimental studies. Many researchers argue that lack of fidelity is likely to compromise the effectiveness of interventions (Yaeger & Walton, 2011). For example, Hulleman and Cordray's 2009 study found that when teachers strayed in their fidelity to the protocols of psychosocial interventions, the interventions were not successful, despite the fact that they had been effective when delivered in a laboratory. This finding suggests a need for research and development efforts focused on support for faithful implementation.

Implementation Context

Another set of implementation challenges relates to the contexts in which these tools and practices are used.

1) CONTEXTUAL MESSAGES

In the classroom, students constantly receive messages about their identities and learning processes. These messages can support or undermine the effectiveness of tools and practices that target academic mindset. For example, an intervention designed to teach students that their intelligence improves over time can be undermined by a classroom context in which teachers genuinely believe their students have fixed, limited abilities and convey that impression to their students. Family and social context may also deeply affect the messages students receive, making it more difficult for academic mindset interventions to create and sustain the positive recursive processes they seek to generate. For example, data from the Conspiracy to Succeed project described earlier indicate that peer culture can change the reward structure for academic behaviors and thus undermine school success.

2) ACADEMIC SUPPORTS

The availability and quality of academic supports also influence whether these tools have maximum benefit. To be successful, students need access at least to basic educational supports. Aronson, Cohen, and McColskey (2009) emphasize that psychosocial interventions “will not ... turn a low-performing and underfunded school into a model school” (p. 14). Several informants we interviewed, including those involved in developing and evaluating the tools and practices we reviewed, also emphasized this point. This suggests the need for research, development, and evaluation of these types of interventions in schools that serve low-income students, students of color, and historically low-achieving students with an eye towards the academic supports that need to be in place before those interventions can affect academic outcomes.

3) TARGET POPULATION AND GENERALIZABILITY

The studies of the tools and practices summarized above were undertaken in a variety of contexts, including some schools serving economically disadvantaged students and students of color. For example, as can be seen in the Appendix, several interventions that focus on teaching students that intelligence grows with effort were implemented with low-income students and students of color in middle and early high school grades. Though the majority of studies in this area focused on middle schools, there were some that included high school students. Overall, this distribution of studies and effects suggests that applying these particular strategies among low-income students and students of color in high school may not by itself strain the generalizability of these studies to the extent that the fundamental expectations regarding implementation and impacts would change. Tools and practices that focus on affirmation and visualization, as well as progress-monitoring interventions, were also studied among students of color in middle and high school.

By contrast, many tools and practices, such as those focusing on shifting explanations for academic and social challenges, have been implemented and studied primarily among college students or among students of color at high-performing upper-middle-class schools. Further research is needed to determine how these approaches might be adapted for low-income students and students of color, particularly those concentrated in underperforming high schools, and whether they would have similar effects.

4) CONTEXTUAL AND ORGANIZATIONAL SUPPORTS

The extent to which mindset interventions rely on the support of families, communities, and schools is an important consideration in implementation and scale-up. Tools and practices that rely on significant family involvement can be undermined by difficulties reaching families and getting them engaged.

Aside from community and family support, the implementation of tools and practices requires organizational support from the school. The quality of schools’ organizational infrastructure, management, and professional relationships—not to mention the turmoil and chaos that sometimes characterize high-need schools—can affect the extent to which interventions are fully and faithfully implemented. The ways in which these challenges have affected progress monitoring interventions and whole-school reforms, which have been implemented on a much broader scale than mindset interventions, are instructive. For example, progress monitoring interventions are undermined by difficulties in obtaining student data. Similarly, obtaining buy-in from teachers for new initiatives that require even minor changes in classroom routines may be particularly difficult in environments without strong institutional leadership or in which teachers hold negative preconceptions about students or their families.

Because mindset tools and practices have not been implemented in as many schools as more “well worn” educational approaches such as whole school reforms, we do not have enough evidence to reliably assess the extent to which they will face similar challenges. The structure of some of these interventions suggests they may face fewer challenges. In particular, because they are often short in duration, require little in the way of materials or training, and can be integrated implemented as part of any curriculum or school

program, the case can be made that these interventions require less organizational support than some other more traditional approaches. Nevertheless, the overall health of the contexts in which they are applied may affect the extent to which the intended practices actually occur. Even these interventions are likely to be affected by the “policy vagaries, inconsistencies, bureaucratic inflexibility, staff turnover, and organizational turbulence” that affect whole-school reforms (Kemple, Herlihy, & Smith, 2005, p. 15).

Section IV:

Conclusions and Recommendations

Our review of the tools and practices designed to foster academic mindsets and key learning strategies suggests conclusions about the state of the field and recommendations for further research and development.

A Number of Promising Tools Exist

Numerous interventions targeting academic mindsets, many of which were evaluated using randomized controlled trials, show meaningful effects on students' academic outcomes. The field appears to have made the most progress in developing, implementing, and studying interventions that teach students about the malleability of the brain. Rigorous studies have found that tools and practices in this area have improved student outcomes. Moreover, these interventions have been translated into practical tools, such as software packages, to support easy implementation across a large number of schools.

The Field Remains at an Early Stage

The field of academic mindset interventions appears to be at an early stage in its evolution. The emerging positive evidence suggests that mindset interventions have the potential to yield vitally important contributions to improved outcomes for at-risk students, low-income students, and students of color. However, the field faces risk that its progress will stagnate or dissipate without generating long-term improvement in student outcomes or in the knowledge base on fostering academic mindsets. Understanding under what circumstances mindset interventions can improve outcomes, and with what supports, requires a process of refining, adapting, and carefully evaluating interventions in the target contexts. If this process loses

momentum, the field is less likely to produce systematic positive changes on a large scale.

A Need for Further Codification

A central theme emerging from the research and from our conversations with key informants is that the mindset approaches themselves need more development and codification. Many developers appear to believe strongly that the specific manner in which their interventions are implemented is crucial to obtaining results. At the same time, most of these opinions are generally not "manualized" or codified into clear implementation guidance that would make them replicable in schools. Nor have variations in implementation been rigorously studied. One reason is that many mindset tools and practices lack a clearly articulated theory of action that describes the specific components of the intervention or approach; the manner in which they must be implemented; the necessary supports for effective implementation; and the relationships among program components, student experiences, intermediate outcomes, and the intended program effects.

Attention to the Interactions among Target Population, Context, and Instruction

The core theories concerning interventions targeting academic mindsets to improve academic outcomes suggest that the school environment can be a crucial variable either mediating or thwarting the interventions' success. However, many of the interventions reviewed here have been implemented only in university settings; fewer have been implemented in schools with substantial populations of high-risk middle and high school students. The success of interventions that address academic mindsets depends on stimulating a

positive, self-reinforcing dynamic that encourages effort and persistence. However, a great many contextual factors can undermine this dynamic. For example, the extent to which schools or classrooms provide ineffective instruction or fail to reinforce positive messages about student ability can quickly undermine the potential effects of the intervention. In another example, a peer culture that penalizes academic effort—which, according to data collected by Ron Ferguson and other researchers, is quite common—can easily undermine these positive recursive cycles.

At the same time, many of these interventions have not been pilot tested, much less evaluated, among high-need students or in schools serving large proportions of poor students and students of color. Moreover, researchers and developers in the field are often quick to say that these interventions are not designed to address the needs of students in low-performing schools. Several researchers with whom we spoke indicated that, though they believe in the potential of mindset interventions to improve student outcomes under certain circumstances, they do not believe that these approaches would accomplish very much in disadvantaged instructional settings and that mindset interventions should not be the first line of attack in low-performing schools. Therefore, pilot testing and adaptation of the interventions are important in order to help the field to ascertain if and under what circumstances they can be effective in more challenging environments.

The Danger of Repeating Past Mistakes

Our conversations with researchers, program developers, and other stakeholders gave us the distinct impression that they wanted to see new, innovative approaches to providing supports for student success and to conducting research around these topics. Nevertheless there appears to be a danger of repeating some of the past mistakes of program development and evaluation in education.

1) GOING TO SCALE TOO QUICKLY

Often, when an idea or intervention has strong early data or a strong theory, as is the case with many mindset interventions, there is a rush to go to scale too quickly. Further, some practitioners and researchers are skeptical of the merits of rigorous evaluation that we believe should precede scaling efforts. Some researchers with whom we spoke as part of our key informant interviews pointed out that the IES recently evaluated a slew of well-defined, carefully studied interventions and found no effects for the vast majority of them. As a result, practitioners and researchers, may therefore be reluctant to distill the existing approaches in this area down to clearly defined interventions with pre-defined core components and implementation supports that can be easily evaluated, for fear that the evaluation will not show effects. Further, there appears to be a belief among some researchers and practitioners that clearly defining and rigorously evaluating the core components of the interventions is not an effective strategy for generating powerful changes, because in doing so, there is sometimes a tendency to separate specific program components and their implementation from efforts to synergistically address the broader contexts into which programs are implemented.

Given the momentum of some commercial developers in this field, and also the skepticism in some corners regarding the merits of rigorous evaluation, there's a risk of attempting to go to scale before program developers have reliable evidence on program effects. More problematically, they risk going to scale before they:

- Fully develop and understand their own theories of action
- Have defined “full implementation” of their tools or what their approaches look like
- Have a clear sense of what supports are necessary to achieve complete (or sufficient) implementation

- Clearly understand, based on evidence, how their approaches interact with or depend on context.

Unfortunately, the reluctance to formally evaluate specific programs may actually increase the danger that the field of academic mindsets will repeat the same mistakes and, by going to scale prior to conducting careful piloting and evaluation, end up with another set of practices that – when they are eventually evaluated – are not shown to be effective. There are repeated examples in education and social policy of interventions that were brought to scale prior to the availability of rigorous evaluation evidence, and were found to have little or no impact on the intended outcomes when they were eventually evaluated (Frumkin & Reingold, 2004). This dynamic can undermine the will for innovation and reform in general and thwart the promise of potentially effective innovations that could have benefitted from iterative rounds of research, development, evaluation, and refinement.

2) GOING BEYOND THE EVIDENCE BASE

A related danger is that some stakeholders make claims and generate expectations that go beyond the evidence base. In particular, though many of those closest to the research are more circumspect, stakeholders on the commercial side (and some others) have an incentive to make outsized claims regarding the potential of mindset interventions to create sea changes—by themselves—in outcomes for poor students and students of color. Many of the interventions with the most promising, substantial results either have not been sufficiently replicated or have not been studied in middle and high schools with large proportions of low-income students and students of color. High expectations for large program effects are probably out of alignment with the results that will emerge when these interventions are rigorously evaluated in typical school contexts. Unless every study comes back with large positive effects—an unlikely scenario—this tendency to make claims beyond what the evidence supports

can set the field up for failure, which in turn can cause consensus and support to unravel.

3) INSUFFICIENT ATTENTION TO ADJACENT FIELDS

Key informants also suggested that not enough attention is being paid to findings and issues from adjacent fields of study that could have a direct bearing on the ability of mindset approaches to make a major difference in the educational outcomes of low-income students and students of color. For example, key informants said that school-based research strongly suggests that peer culture can have a dramatic effect on students' beliefs about the payoff of effort. In particular, Ron Ferguson's research has repeatedly found that peer dynamics can sometimes enforce a substantial social penalty against the appearance of academic effort (though not against academic performance itself) (personal communication, August 27, 2012). This dynamic appears in a variety of schools with varying levels of economically disadvantaged students, but has a disproportionately negative effect on students of color and low-achieving students. Existing designs of and studies on mindset interventions largely ignore these dynamics. There are lessons from other related fields, such as 9th grade transition programs and progress monitoring interventions, and other work focused on "student engagement" that are often not included as part of this discussion. Failure to include lessons from these fields may increase the likelihood of design and implementation gaps that can undermine the effectiveness of tools and practices in the area of student mindsets.

Recommendations

This review identifies, describes, and discusses the evidence regarding tools and practices aimed at fostering academic mindsets. Most are small interventions that emphasize student attitudes, beliefs, and dispositions related to *grit and growth*, *identity and community*, and *passion and purpose*.

The current state of the research, development, and evidence suggests several crucial needs that must be met before work in this field can result in the development of evidence-based mindset interventions that improve outcomes for large numbers of low-income students and students of color.

1) DEFINITION AND COLLABORATION

A meaningful amount of high-quality research is being conducted on tools and practices that target academic mindsets. Nevertheless, the field appears to be at a point that requires definition of the scope, goals, and priorities of the research, development, implementation, and evaluation of practices concerning academic mindsets. A number of high-priority issues must be addressed. Our review of the research and our key informant interviews suggest that a number of university researchers, commercial developers, and philanthropic organizations are working independently to pursue their own agendas. Though some important collaborations are emerging, it is not clear that there is a community of practice systematically working together to address these core challenges. The field could benefit from convening stakeholders, including those from relevant adjacent fields, to discuss how this work could generate change. Such a group could assess the state of the field and create an agenda, or set of priorities, to guide research, development, and evaluation. In addition to convening important conversations, a grant-making organization might help to create an agenda for the field, supporting collaboration and moving stakeholders forward in defining and then accomplishing key milestones.

2) DEVELOPMENT AND PILOT TESTING

In addition to a research agenda, the field needs a development and design agenda. For nearly all mindset tools and practices, important practical questions about design and implementation supports remain to be answered. A great deal needs to be codified, pilot tested, and refined in order to develop practical interventions with maximum potential. However, it is unclear whether incentives exist to motivate individual researchers or commercial developers to answer these questions. Consequently, support for a research and development agenda focusing on key questions could provide a solid basis for effective scale-up and evaluation.

Key aspects of this agenda might include developing clearer definitions of program components and implementation supports, codifying theories of action and intermediate outcomes, identifying key mediating and context variables, pilot testing in a variety of environments, and refining program components and theories of action based on these pilots. This work could put the field in a better position to tap existing funding to support replication and evaluation.

3) REPLICATION AND EVALUATION

The promising interventions outlined above should be replicated and evaluated to address the needs of the most vulnerable student populations. Although some funding may be available for these efforts, the field would benefit from a concerted attempt to accelerate the work, ensure that it addresses the right priorities and the most important needs, and disseminate the results to key stakeholders. Such an agenda could be set and supported by grant-makers who are already familiar with the field and deeply invested in improving outcomes for those students in greatest need.

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APPENDIX: Summary of Interventions That Promote Academic Mindsets

INTERVENTION CATEGORY A:

Interventions that provide instruction that intelligence grows with effort

INTERVENTION #1	Workshops on brain malleability (Blackwell, Trzesniewski, & Dweck, 2007)
FOCUS AREA	Grit and Growth
DESCRIPTION	Students take part in an eight-session workshop that teaches that intelligence is malleable and the brain “grows like a muscle.”
DURATION	Eight 25-minute workshops.
EVIDENCE OF IMPACT	Students in treatment group earned higher grades reversing normative ninth grade declines in math grades (ES=.27).
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh grade students • Low-income • African-American and Latino • Urban setting
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #2	Brainology computer-based program (Paunesku, Goldman, & Dweck, undated; Romero, Paunesku & Dweck, undated)
FOCUS AREA	Grit and Growth
DESCRIPTION	Interactive software that teaches students about the malleability of intelligence.
DURATION	Two and one half (2.5) hours of online instruction; 10 hours worth of additional classroom activities.
EVIDENCE OF IMPACT	Unpublished studies report increased grade point average (ES=0.21 grade points) and improved behavior.
STUDY CONTEXT	<ul style="list-style-type: none"> • Middle grade students • Latino • California
NOTABLE IMPLEMENTATION FACTORS	Costs: \$6,000 per site. Can buy individual student/educator licenses.

INTERVENTION #3	Mentors (Good, Aronson, & Inzlicht, 2003)
FOCUS AREA	Grit and Growth
DESCRIPTION	College mentors work with seventh graders over the course of the year to provide instruction on the malleability of the brain, and that academic difficulties are common. Mentors communicated with students via email and in two 90-minute sessions at the school. Students created and published public service announcements to internalize the message.
DURATION	Two 90-minute in-person sessions and online participation over the course of one academic year.
EVIDENCE OF IMPACT	Scores on the state reading test were significantly higher for students in the conditions receiving the incremental (malleable) intelligence message (ES=0.52) and the attributional message (ES=0.71) than for students in the control group.
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh grade students • Low-income • African-American, Latino, and White • Rural Texas school district
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #4	Pen Pal activity (Aronson, Fried, & Good 2002)
FOCUS AREA	Grit and Growth
DESCRIPTION	Students are taught that intelligence is malleable by taking part in a pen pal activity that involves writing supportive letters to middle school students.
DURATION	Three one-hour sessions spaced 10 days apart.
EVIDENCE OF IMPACT	African-American and white students' grade point averages rose (ES=0.23). For African-American students, GPA was 3.32 for the intervention group compared to 3.05 in the control group; for white students, GPA was 3.55 for the intervention group compared to 3.34 in the control group – both statistically significant changes.
STUDY CONTEXT	<ul style="list-style-type: none"> • College students • African-American and white • Selective university
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #5	Jensen Learning (Jensen 2008)
FOCUS AREA	Grit and Growth
DESCRIPTION	Series of teacher and administrator workshops designed to show teachers how children’s brains learn and remember information, and how best to help students learn successfully. Strategies are provided to help students become more engaged in the classroom. A special series is devoted exclusively to helping students living in poverty succeed academically.
DURATION	Workshops are generally between two to four days long. PowerPoint presentations and shorter conference addresses are available.
EVIDENCE OF IMPACT	Intervention is supported by a broad and extensive evidence base; however, there have been no rigorous impact studies of the intervention itself to date. Any “brain-based” claim is difficult to substantiate because of the paucity of evidence given the relative newness of brain imaging techniques like MRI.
STUDY CONTEXT	<ul style="list-style-type: none"> • Teachers • Low-income • Mainly in the Southern and Western U.S.
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY B:

Providing instruction to shift students' explanations of why they are struggling academically

INTERVENTION #1	Attribution intervention (Wilson & Linville, 1985)
FOCUS AREA	Grit and Growth
DESCRIPTION	Students watch videos of college seniors discussing how their grades were low in freshman year but improved over time.
DURATION	One session
EVIDENCE OF IMPACT	Improved test score performance on GRE exam for male students (ES=0.45); increased grade point average for male and female students (ES=0.27).
STUDY CONTEXT	Academically struggling first year college students
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #2	Exercises using survey data, essay writing, speech writing/delivery (Walton & Cohen, 2007; 2010)
FOCUS AREA	Identity and Community
DESCRIPTION	Students read survey data that reveals that all students have anxieties about belonging. Students then write essays and deliver speeches to future freshman students about how anxieties about belonging decrease over time.
DURATION	Two sessions and completion of diary entries for seven days.
EVIDENCE OF IMPACT	African-American students in the treatment group earned higher grade point averages from their sophomore through their senior years. This reduced the achievement gap between white and African-American students by 52%. Students in the treatment group were more likely to be in the top 25% of their graduating class (ES=0.34).
STUDY CONTEXT	<ul style="list-style-type: none"> • First year college students • African-American and white • Selective college
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #3	“Wise” critical feedback (Cohen et al., 1999)
FOCUS AREA	Grit and Growth
DESCRIPTION	Students were given critical feedback on a writing assignment and were told that they were being held to a high standard that they were capable of achieving.
DURATION	Two sessions approximately one week apart.
EVIDENCE OF IMPACT	<p>African-American students who received critical feedback along with an invocation of high standards and an assurance that they could meet those standards reported:</p> <ul style="list-style-type: none"> • Less bias on the part of the reviewer of their work; • Greater motivation for the task; • A greater willingness to consider a career involving writing.
STUDY CONTEXT	<ul style="list-style-type: none"> • Undergraduate college students • African-American and white • Highly selective university
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #4	Anxiety reappraisal (Jamieson et al., 2010)
FOCUS AREA	Grit and Growth
DESCRIPTION	Immediately prior to a GRE practice exam, students were instructed that anxiety may improve test performance.
DURATION	Intervention administered prior to start of exam.
EVIDENCE OF IMPACT	Improved performance on the math section of the practice GRE (ES=0.82); no difference in verbal performance; reduced self-reported worry about anxiety (ES=0.67); improved performance on math section of actual GRE taken one to three months after the intervention (ES=1.03).
STUDY CONTEXT	College students planning to take the GRE within 3 months
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #5	Expressive writing exercise (Ramirez & Beilock, 2011)
FOCUS AREA	Grit and Growth
DESCRIPTION	Immediately before a high-stakes exam, students were asked to spend ten minutes writing openly about their thoughts and feelings about the upcoming exam.
DURATION	Ten minutes immediately prior to start of exam.
EVIDENCE OF IMPACT	Improved performance on the math section of the practice GRE (ES=0.82); no difference in verbal performance; reduced self-reported worry about anxiety (ES=0.67); improved performance on math section of actual GRE taken one to three months after the intervention (ES=1.03).
STUDY CONTEXT	<ul style="list-style-type: none"> • College students • Ninth grade students
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY C:

Affirmation and visualization exercises

INTERVENTION #1	Values essay (Cohen et al., 2006)
FOCUS AREA	Identity and Community, Grit and Growth
DESCRIPTION	Students are asked to complete a values exercise in which they write about the values most important to them.
DURATION	One 15-minute session.
EVIDENCE OF IMPACT	Students in the treatment group had increased grade point averages at the end of the fall term (ES=0.26 grade points; ES=0.34 grade points).
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh grade • African-American and white • Northeastern U.S.
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #2	'Possible selves' workshop (Oyserman, Bybee, & Terry, 2006)
FOCUS AREA	Identity and Community, Grit and Growth
DESCRIPTION	Students attend 11 workshops that help students to envision and develop the strategies to achieve positive possible selves.
DURATION	Eleven sessions with students and two follow-up sessions that included students, parent guardians, and community members.
EVIDENCE OF IMPACT	Participants had fewer absences (ES=0.27), fewer unexcused absences (ES=0.73), fewer incidents of disruptive behavior (ES=-0.21), spent more time on homework (ES=0.16), had higher GPAs (ES=0.25), and increased performance on standardized tests (ES=0.36).
STUDY CONTEXT	<ul style="list-style-type: none"> • Middle school students • Low-income • African-American, Latino, and white • Detroit
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY D:

Exercises that relate coursework to students' lives

INTERVENTION #1	Relevance writing exercise (Hulleman & Harackiewicz, 2009)
FOCUS AREA	Passion and Purpose
DESCRIPTION	Students asked to write a small number of short essays over the course of a single semester. The essays were to relate science topics from class to their lives.
DURATION	One semester
EVIDENCE OF IMPACT	For students with low expectations for success in science, effects were: <ul style="list-style-type: none">• Increased second-quarter grades by roughly two-thirds of a letter grade;• Increased interest in science.
STUDY CONTEXT	<ul style="list-style-type: none">• Ninth grade science students• African-American, Latino, and white• Midwestern U.S.
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY E:

Tools designed to improve students' learning strategies

INTERVENTION #1	SOAR Study Skills (Jairam & Kiewra, 2010)
FOCUS AREA	Grit and Growth, Academic Behaviors, Learning Strategies
DESCRIPTION	"Select, Organize, Associate, Relate" – students learn skills relating to each of these behaviors. Students learn to select and write down important ideas from a lecture, graphically organize their notes, associate these ideas together (and with old knowledge), and generate practice test questions to study.
DURATION	Entire academic year
EVIDENCE OF IMPACT	On two different kinds of tests, college students using the SOAR methods scored significantly better than those not using the SOAR methods (ES=0.42; ES=0.60). These effects were particularly strong in a test of relationships between different concepts and ideas. SOAR participants identified almost twice as many relationships correctly than did non-SOAR users.
STUDY CONTEXT	College undergraduates
NOTABLE IMPLEMENTATION FACTORS	Can be adapted for use both on a computer and with written/printed materials. SOAR is also used with middle and high school students, as well as undergraduates. SOAR can be used by any student, but was specifically designed for use by traditionally lower-achieving students (C level) while in class and while studying (e.g., reviewing materials out of class). Implemented in 1000+ schools, both urban and suburban.

INTERVENTION #2	Brainware (Safari) (Helms & Sawtelle, 2007)
FOCUS AREA	Learning Strategies
DESCRIPTION	An educational software program that builds skills in six designated areas: attention, memory, visual processing, auditory processing, thinking, and sensory integration. The company has identified 41 skills for students to practice with its software in order to improve in these six domains. There are 20 successive levels, each with many different activities.
DURATION	The company recommends usage three to five times per week for 30-60 minutes for approximately 12 weeks.
EVIDENCE OF IMPACT	<ul style="list-style-type: none"> • One study showed that children aged 6-13 using BWS had an average of 4.25 years of improvement (versus four months for the control group) on cognitive tests. • The same study showed that BWS users had an average of about two years of improvement (versus one month) on tests of achievement. • A number of other studies showed statistically significant gains in GPA.
STUDY CONTEXT	<ul style="list-style-type: none"> • Elementary and middle school students with learning disabilities or other special needs • Suburban environments
NOTABLE IMPLEMENTATION FACTORS	The program costs \$175 for one individual user and \$500 for a family. Can be adapted for use with English language learners or children with special needs, and for out of school programs.

INTERVENTION #3	Mental contrasting/implementation intentions (MCII) writing exercise (Duckworth et al., 2011)
FOCUS AREA	Grit and Growth
DESCRIPTION	Students planning to prepare for the PSAT over the summer wrote essays describing their desired futures, identifying obstacles, and planning how to deal with obstacles regarding PSAT practice tests.
DURATION	One 30-minute writing session.
EVIDENCE OF IMPACT	Students completing the exercise completed 60% more practice problems over the summer.
STUDY CONTEXT	<ul style="list-style-type: none"> • Sophomore high school students • Selective urban high schools • Northeastern U.S.
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #4	Online goal-setting program (Morisano et al., 2010)
FOCUS AREA	Grit and Growth
DESCRIPTION	Intensive online goal-setting program, involving writing exercises related to students' desired futures, specific goals related to those futures, plans for achieving those goals, and student commitment to goal achievement.
DURATION	Two and one half (2.5) hours
EVIDENCE OF IMPACT	Higher GPAs (ES=0.50), better retention, and reduction in self-reported negative affect (ES=0.46).
STUDY CONTEXT	<ul style="list-style-type: none"> • Academically struggling college students • Canada
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #5	ThinkerTools Inquiry Curriculum (White & Frederickson, 1998)
FOCUS AREA	Learning Strategies, Academic Behaviors
DESCRIPTION	ThinkerTools Inquiry Curriculum is a software and curriculum bundle that helps students learn and understand the processes of force and motion by facilitating the development of metacognitive knowledge and skills as students learn the inquiry processes needed to create and revise their own theories.
DURATION	Implemented as part of classroom curriculum.
EVIDENCE OF IMPACT	Middle school students performed better than high school students on both the inquiry assessment and the physics knowledge assessment, while students who completed the Reflective Assessments as part of the ThinkerTools Inquiry Curriculum performed better than students who did not complete the Reflective Assessments on both tests. ES not available.
STUDY CONTEXT	Seventh through ninth graders in science classrooms
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #6	Student Success Skills (SSS) (Brigman & Campbell, 2003)
FOCUS AREA	Learning Strategies, Academic Behaviors
DESCRIPTION	SSS is a structured large and small group intervention for middle school students targeting the cognitive, social, and self-management skills that have been shown through research to be related to improved academic achievement.
DURATION	Throughout the school year—eight weekly sessions followed by four booster sessions one month apart
EVIDENCE OF IMPACT	Several studies have shown significant differences between treatment and control students in reading and math achievement on the Florida Comprehensive Assessment Test. (Reading ES=0.11 to 0.25; Math ES=0.36 to 0.51.)
STUDY CONTEXT	Fifth through ninth graders with personal, social, and academic behaviors
NOTABLE IMPLEMENTATION FACTORS	Intervention is led by school counselors

INTERVENTION #7	Reading Apprenticeship (RA) (Greenleaf et al., 2010)
FOCUS AREA	Grit and Growth, Learning Strategies
DESCRIPTION	RA is a model of academic literacy instruction designed to improve literacy skills and academic achievement among struggling readers by drawing on four dimensions of classroom life: social, personal, cognitive, and knowledge-building.
DURATION	Throughout the school year
EVIDENCE OF IMPACT	Treatment teachers scored higher than control teachers on 8 of the 14 sub-constructs included on a teacher survey (ES=0.48 to 1.14). Students in the treatment group outperformed the control group on state standardized assessments in English language arts, reading comprehension, and biology (ES=0.23, ES=0.24, ES=0.28).
STUDY CONTEXT	<ul style="list-style-type: none"> • Ninth and tenth grade biology students • African-American, Asian, Latino, and white
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY F:

Progress monitoring and support programs

INTERVENTION #1	ALAS (Larson and Rumberger 1995)
FOCUS AREA	Identity and Community, Purpose and Passion, Academic Behaviors
DESCRIPTION	<p>Close support and monitoring program. Students are paired with an adult Success Coach who monitors school engagement and provides personalized support when needed. Program also includes parental and community involvement, as well as a daily course teaching various skills.</p> <p>The program targets students who had been identified as either learning disabled or severely emotionally disturbed, or as high-risk, based on a screening mechanism.</p>
DURATION	Entire academic year; in original implementation, participants were in the program for all three years of junior high school.
EVIDENCE OF IMPACT	<p>At the end of ninth grade:</p> <ul style="list-style-type: none"> • Lower dropout rate among special education students (13% vs. 24%) and high-risk students (2% vs. 17%) • Higher proportion of special education students earning 60 credits (54% vs. 30%) • Higher proportion of special education and high-risk students on track to graduate in four years (81% vs. 49%; 72% vs. 53%) and in five years (87% vs. 61%; 84% vs. 69%) • Reduced incidence of absences of 25% of days or more among special education and high-risk students (19% vs. 43%; 15% vs. 38%) • Fewer failed classes for both special education and high-risk students across six subjects (English, Math, History, two Electives, and PE)
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh through ninth graders with learning or emotional/behavioral disabilities • Low-income • Primarily African-American • Northern Midwest urban school district • Has since been implemented in urban and suburban communities, in elementary and secondary schools, and among students with and without disabilities.
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #2	Check & Connect (Sinclair et al., 1998; Sinclair, Christenson, & Thurlow, 2005)
FOCUS AREA	Identity and Community, Passion and Purpose, Academic Behaviors
DESCRIPTION	Close support and monitoring program. Students paired with an adult mentor who monitors school engagement and intervenes to provide personalized support if necessary.
DURATION	Entire academic year; students remain in the program for a minimum of two years.
EVIDENCE OF IMPACT	Positive effects on: <ul style="list-style-type: none"> • Credits accumulated in first year of high school (12.13 vs. 6.63); • Proportion of students on-track to graduate within five years (68% vs. 29%); • Attendance patterns in years 3-5 of high school: (ES=0.22; 0.32; 0.48); • Incidence of persistent attendance patterns (85% vs. 64%); • Four-year dropout rates (ES=0.18); • Enrollment in school in 5th year of high school (ES=0.53).
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh through ninth graders with learning or emotional/behavioral disabilities • Low-income • Primarily African-American • Northern Midwest urban school district • Has since been implemented in urban and suburban communities, in elementary and secondary schools, and among students with and without disabilities.
NOTABLE IMPLEMENTATION FACTORS	Costs approximately \$1,400 per student per year, as of the 2001-2002 school year.

INTERVENTION #3	Marvul Truancy Intervention (Marvul, 2012)
FOCUS AREA	Academic Behaviors
DESCRIPTION	Five month program including daily phone calls to students' homes before school, a moral issues class, and the sponsorship of club football and basketball teams.
DURATION	Five months
EVIDENCE OF IMPACT	Positive effects on: <ul style="list-style-type: none"> • Absences • Educational expectations • Attitude toward education • Engagement
STUDY CONTEXT	<ul style="list-style-type: none"> • High school students • Low income • African-American and Latino • Inner-city alternative high school for at-risk students
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #4	Advancement Via Individual Determination (AVID) (Black et al., 2008)
FOCUS AREA	Identity and Community, Passion and Purpose, Academic Behaviors
DESCRIPTION	School-wide program designed to increase college enrollment among students of color and disadvantaged students. Program targets middle-achieving students; students are also screened on motivation and parent commitment. Program consists of an AVID elective class that meets daily and tutoring provided by current college students. Participants are also required to take one challenging course (e.g., honors, AP) as part of their schedule.
DURATION	Entire academic year
EVIDENCE OF IMPACT	AVID students: <ul style="list-style-type: none"> • Reported increased time spent on homework (ES=0.63); • Enrolled in eighth grade algebra at higher rates (100% vs. 47%); • Experienced greater absences (ES=0.69) • Reported higher grades (ES=0.83); • Performed better on a state standardized mastery writing test (ES = 0.62).
STUDY CONTEXT	<ul style="list-style-type: none"> • Sixth and seventh grade students • African-American and Latino • Urban Northeastern schools
NOTABLE IMPLEMENTATION FACTORS	<p>\$755 per student (in the 2002-2003 school year, Oswald, 2002)</p> <p>Has been widely adopted.</p> <p>Targets students typically underrepresented at four-year colleges, including minorities and students who face obstacles to college enrollment.</p> <p>Currently implemented in over 4,800 elementary and secondary schools in 48 states, the District of Columbia, and 16 countries/territories.</p>

INTERVENTION #5	The Efficacy Institute SDIS (Self-Directed Improvement System) (Howard, 1990)
FOCUS AREA	Grit and Growth, Identity and Community
DESCRIPTION	Provides a data-driven service directly to school administrators of self-identified “struggling” schools. SDIS offers a needs assessment, coaching, and targeted training to teachers, staff, and administrators in an effort to bring the school up to standards. SDIS also involves students in the effort, empowering them to act as behavioral “role models” and coaches for their peers.
DURATION	At least one academic year, but often longer in duration (until school achieves state benchmarks).
EVIDENCE OF IMPACT	<ul style="list-style-type: none"> • A study in one elementary school showed gains of 35% (vs. 15% for the district) in 2nd grade math proficiency, with a similar gain in reading proficiency • A study in two middle schools showed gains of 25% and 30% vs. less than 10% gain for the district in math proficiency.
STUDY CONTEXT	Elementary and middle schools
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION CATEGORY G:

Programs that integrate content-specific instruction with mindset development

INTERVENTION #1	Academic Youth Development Program (Charles A. Dana Center) (Bush-Richards et al., 2011)
FOCUS AREA	Grit and Growth, Identity and Community
DESCRIPTION	Students are taught about the malleability of intelligence, attribution strategies, and work with an interactive mathematics curriculum.
DURATION	Summer: Three week experience; School year: year-long curriculum.
EVIDENCE OF IMPACT	Internal pre /post study of AYD summer program participants indicated positive shifts in students' attitudes and beliefs about malleability of intelligence (ES=0.12 to 0.14), persistence (ES=0.02 to 0.04), sense of belonging (ES=0.05 to 0.06), and problem-solving strategies (ES=0.03 to 0.04).
STUDY CONTEXT	<ul style="list-style-type: none"> • Seventh and eighth grade students • African-American, Asian, Latino and white • Urban, suburban and rural school districts
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #2	Self-regulated learning (SRL) classrooms (Zimmerman et al., 2011)
FOCUS AREA	Grit and Growth, Learning Strategies
DESCRIPTION	Instructors trained to use SRL components to teach math classes, which focused on teaching students to respond to grades as learning tools rather than as indicators of personal limitations.
DURATION	One 15-week semester
EVIDENCE OF IMPACT	<p>For students in developmental math classes, the intervention led to better performance on periodic exams (ES=0.39; ES=0.55; ES=0.50); more students passing the course (ES=0.19); and a greater likelihood of passing a subsequent required college entrance exam (ES=0.15).</p> <p>For students in introductory math classes, the intervention led to better performance on all three periodic exams (ES=0.39; ES=0.29; ES=0.44); better performance on the final exam (ES=0.47); and more students passing the course (ES=0.24).</p>
STUDY CONTEXT	<ul style="list-style-type: none"> • College students • Urban public technical college
NOTABLE IMPLEMENTATION FACTORS	N/A

INTERVENTION #3	Concept-Oriented Reading Instruction (CORI) (Guthrie et al., 2004)
FOCUS AREA	Passion and Purpose
DESCRIPTION	Classroom-level reading instruction approach that combines support for cognitive strategies in reading with support for motivation. Motivation supports were provided through five practices: 1) using content goals for reading instruction; 2) affording choices and control to students; 3) providing hands-on activities; 4) using interesting texts for instruction; and 5) organizing collaboration for learning from text. Cognitive supports were provided for six comprehension strategies: 1) activating background knowledge; 2) questioning; 3) searching for information; 4) summarizing; 5) organizing graphically; and 6) identifying story structure.
DURATION	Instruction provided for 90 minutes daily for 12 weeks from mid-September to mid-December.
EVIDENCE OF IMPACT	<p>Compared to learning strategy instruction only, CORI students performed better in terms of:</p> <ul style="list-style-type: none"> • Multiple text comprehension (ES=1.01) • Passage comprehension (ES=1.32) • Comprehension strategy (ES=1.23) • Reading motivation (ES=0.98) • Teacher-reported intrinsic motivation (ES=1.23) • Teacher-reported extrinsic motivation (ES=1.29) • Composite motivation score (ES=1.28) <p>Compared to students in classrooms receiving regular instruction, CORI students performed better in terms of:</p> <ul style="list-style-type: none"> • Passage comprehension (ES=2.75) • Reading comprehension (ES=0.71)
STUDY CONTEXT	<ul style="list-style-type: none"> • Third graders • Small city in a Mid-Atlantic state
NOTABLE IMPLEMENTATION FACTORS	N/A