Math and Science Engagement:
Identifying the processes and psychological theories that underlie successful social-psychological interventions

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Introduction

As educators and schools are facing increased scrutiny to improve academic outcomes, many are implementing reforms that target improving student achievement and completion rates by revising content curriculum and changing the way students engage the material. Unfortunately, rigorous evidence demonstrating that changes in these areas lead to higher academic engagement and achievement does not exist (Farrington, et al, 2012). There are promising indications, however, that brief interventions targeting students' thoughts, feelings, and beliefs in and about school do work and that they have long-lasting effects on academic engagement and achievement (Yeager & Walton, 2011). These interventions have such powerful results that many practitioners and researchers laud them as "*magic bullets*" and want to know more about the magic.

In one such intervention, low- and middle-income Black and White students at a suburban school completed a 15-minute in-class exercise during which they wrote about values that were personally important to them. This brief intervention led to an increase in the academic achievement of Black students by .30 grade points and reduced the achievement gap between Black and White students by 40% that term. Further, this effect on achievement persisted past the first term as demonstrated by a .46 grade point improvement among low-performing Black students after two years (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009; Cohen, Garcia, Apfel, & Master, 2006).

Another magic bullet intervention focused on having 9th-grade students periodically write brief essays on how the material they are studying in their high school science class could be applied to their lives. Among students with low initial expectations for success, those who participated in these writing tasks earned grades that were .80 points higher than their peers who instead summarized what had been discussed in class that week (Hulleman & Harackiewicz, 2009).

How are these results possible? Part of the magic of these interventions is that, instead of focusing on revising content and delivery, these interventions focus on addressing non-cognitive, or psychological, factors that, when aligned optimally, allow students to take better advantage of their learning opportunities. The interventions help students rewrite their personal academic identity narratives, altering their *academic mindsets*—the beliefs, attitudes, and ways of perceiving themselves as students and their learning environment. Combining these positive academic mindsets and necessary academic skills, students are then able to look beyond short-term concerns to longer-term or higher order goals and are equipped to withstand challenges and setbacks as they persevere toward these goals. In essence these students manifest productive persistence.

While there are many successful short-term interventions that specifically target non-cognitive factors that contribute to student success, longer-term interventions during school time and in out-of-school specific programs have successfully incorporated a focus on non-cognitive factors in their curriculum as well. Closer inspection of a variety of programming options provides guidance on how to include a focus on academic mindsets and the elements that lead students to be productively persistent when designing an intervention program.

This brief summarizes the leading research on productive persistence, student motivation, and social-psychological interventions in education. The purpose of this brief is to identify psychological factors that contribute to student engagement and persistence, to illuminate the separate processes underlying successful social-psychological interventions, and to provide specific examples that illustrate how successful programs can address non-cognitive factors.

Productive Persistence: A definition

Productive persistence, a term coined by Uri Treisman, is an umbrella expression used to describe the interplay between motivation and engagement, manifesting itself in the mindsets and skills that allow students to look beyond short-term concerns to longer-term or higher-order goals and to withstand challenges and setbacks to persevere toward achieving these goals.

Evidence of productive persistence can be gathered by looking at behavioral, cognitive, and emotional engagement in learning activities. Productively persistent students are fully engaged in learning and are motivated to expend effort to reach long-term, personally meaningful goals. They actively pay attention during learning activities and value the benefits of participating in the activities. In addition, productively persistent students challenge themselves to work toward aggressive goals, even in the wake of setbacks. They understand the importance of schooling and they take pride in persevering in achieving their goals. Productively persistent students know multiple strategies that can be used in diverse learning situations, and they are able to employ a strategy that fits the demands of the academic tasks that face them.

Promising Ideas to Increase Student Motivation and Productive Persistence

Theory of Intelligence

Research by Dweck and Leggett (1988) demonstrated that students' belief in the malleability of their intelligence—that intelligence develops in part through strategic effort—shapes their academic engagement. Students who believe that their academic abilities can be increased with effort are said to endorse a *growth* (or incremental) theory of intelligence. Students who believe academic abilities cannot be changed are said to endorse a *fixed* (or entity) theory of intelligence.

Students with a growth mindset attend class more often, elect to complete more challenging activities in class, and ask for help when they encounter unknown or unfamiliar information. Believing that their intelligence can change also drives students to persist longer when faced with academic setbacks or challenges, so it should come as no surprise that students with a growth mindset tend to demonstrate more continuous improvement and earn higher grades than their fixed mindset peers. Students who view intelligence as fixed, on the other hand, interpret asking for help as an indication of low intelligence, and, as a result, often do not seek help even when they are aware that doing so is necessary. This avoidant help-seeking behavior begins a spiral of negative academic experiences wherein poor understanding contributes to low grades, fostering negative self-beliefs that reinforce students' initial notion that their intelligence cannot be altered (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 1999; 2008).

2

Self-Efficacy

Bandura (1993, 1997) demonstrated that confidence in ones' ability to be successful at a given task, ones' *self-efficacy*, influences how a person thinks and behaves. Regardless of what may be objectively true about their capabilities, students' subjective beliefs about their abilities guide the choices they make, the effort they put forth, and the persistence and perseverance they display in the face of difficulties (Usher & Pajares, 2008). Recent studies have even substantiated that students' perceptions of their abilities are better predictors of academic performance than their actual abilities (Pajares & Schunk, 2002). Take for example two students with the same abilities. Student One has positive self-efficacy beliefs regarding her writing abilities and may, as a result, quickly sign up to take a challenging literature course. Student Two, who has low confidence in his ability to be successful in an English course, may avoid the literature course, disregarding evidence that with the proper amount of effort, he could be successful in the course. These two reactions illustrate that student confidence can be tied to both academic tasks (e.g. test taking, public speaking, essay writing) and to academic content (e.g. English classes, geometry proofs).

Productively persistent students are confident in their abilities to be successful and they are able to articulate how they know they can be successful. And, as is expected, students tend to engage in activities if they are confident that they can be successful at them, and they tend to avoid activities when such confidence is lacking. But where do these beliefs come from? Researchers have identified three main sources of self-efficacy: past "enactive mastery" experiences, vicarious experiences, and verbal/social persuasions (Usher & Pajares, 2008). *Mastery experiences* encompass our past successes and failures in a given content area and are the most salient, influential source of information students use in determining their confidence. In addition to firsthand experiences, self-efficacy beliefs are shaped when students witness their peers succeed or fail. Students gauge their own ability through the observation of others perceived to be of similar ability for a specific task, and through these *vicarious experiences*, they judge the likelihood that they themselves can be successful at the task (Usher & Pajares, 2008). Finally, students make judgments about their confidence based on the messages they receive from others, or *social persuasion*. When social persuasions are encouraging, self-efficacy for a task increases (DeWitz, Woolsey, & Walsh, 2009). However, when an external source (peer, teacher, parent) predicts a negative task outcome based on an individual's abilities, competency beliefs will likely decrease.

Attributions

Attributions are the reasons students give for their successes and failures and most psychological research has focused on identifying where the explanations students give fall on the internal/external, controllable/uncontrollable, and stable/unstable continuums (Weiner, 1986, 1992, 2000) Productively persistent students make internal, controllable attributions for their successes and failures, citing something from within to explain the outcome. For example, when they receive a high score on an assignment, these students cite their use of good study habits and their adaptive help-seeking as reasons for their high performance. They do not include external factors over which they have little control, such as the teacher's grading scheme or an easy test, or uncontrollable factors, such as luck, in their explanations (Oyserman, Bybee, & Terry, 2006).

Students are most likely to persist if they attribute their successes and failures to internal, unstable factors over which they have control (e.g. effort). Students who attribute failures to internal, controllable, and/or unstable factors can motivate themselves to work harder instead of giving up after setbacks in school because they feel that *doing something* is believed to affect the outcome. Hence, expending effort now will not necessarily result in the same negative outcome obtained the last time a similar task was attempted. But, when students make external, uncontrollable, or unstable attributions, motivation suffers. Particularly troublesome are stable, uncontrollable explanations (e.g. "I am just not naturally smart" indicating innate ability or "The test was too hard" referencing the nature of the task) because under these conditions, the outcomes (e.g. test performance) are not believed to be connected with anything the student can change to improve performance for the next time.

Belongingness

When students believe that they are part of the academic community and are socially connected to their peers and teachers, they are more motivated, more engaged, and earn better grades (Goodenow, 1992; Furrer & Skinner, 2003; Roser, Midgley, & Urdan, 1996). This sense of belongingness generally fortifies students' positive views of themselves and their environment, helping them feel more competent in their role as a student and ultimately makes them more likely to move past temporary concerns and setbacks and engage in more productive academic behaviors (Walton & Cohen, 2011; Osterman, 2000).

Social isolation is a leading cause of dropping out of school, but, fortunately, students can develop interaction skills by being taught how to get involved in academic and non-academic activities with other students (Masi, Chen, Hawkley, & Cacioppo, 2011). These strong ties increase productive persistence behaviors and can even help to ameliorate the effects negative stereotypes could have on a student's identity (Walton & Cohen, 2011). One longitudinal study even found that strong positive social relationships during early elementary years did a better job predicting later elementary performance than did early academic achievement (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000), indicating the long lasting impact fostering a sense of belonging in learning environments can have.

Value and Interest

The degree to which students value the outcome of an academic task strongly influences the activities they choose to participate in, their performance at those tasks, and their response when faced with a challenge or a setback. If being successful in a particular task is not valuable or of interest to the student, the student is unlikely to put forth effort and persist when faced with a setback (Wigfield & Eccles, 1992). Additionally, if students are confronted with too many options in their classroom, they may find it difficult to determine which option hold the most value and interest for them, leading them to feel so overwhelmed that they disengage from activities instead of choosing one (Patall, Cooper, & Wynn, 2010).

Productively persistent students view academics as an integral part of their future. The careers they want to have and the lives they envision themselves living in both the short and long terms require mastering academic work (Oyserman, Bybee, & Terry, 2006). Students may, therefore, view activities as having *intrinsic value*, leading them to engage because they are inherently interested in the activity or topic. Activities may also be perceived to have utility value, indicating that the student believes that the outcome of the task is useful in

attaining current and future goals (Hidi & Harackiewicz, 2000) and if the task is framed as useful to the future goal and not as mundane schoolwork to be completed (Destin & Oyserman, 2010). As the science-classroom writing intervention introduced earlier showed, making classroom topics personally relevant and establishing explicit connections between current academic tasks and personally meaningful future goals increases interest and engagement in science. This ultimately led to improved performance among students who did not expect to succeed in the class.

Goals

As outlined above, productively persistent students view academics as an integral part of their future and can see how mastering academic work in the short-term helps them accomplish their long-term goals. Goals are most motivating when set by the student; in this way the goal is personally meaningful and is inherently something the student wishes to work toward. Also critical in student goal setting is that students feel that the long-term goal is challenging, yet attainable and realistic for them. Students need to believe that the future self represented is possible, that "people like me" can have this outcome. Additionally, productively persistent students are aware of what it takes to accomplish the goal. This awareness allows them to set smaller short-term, or enabling, goals and employ self-regulation strategies to help them accomplish the necessary tasks.

Additionally, researchers investigating students' core achievement goals have identified two main pathways students can take when pursuing academic outcomes. Students who focus their thoughts and behaviors on demonstrating that they are capable of completing a certain task are categorized as having a *performance* goal orientation. Students who focus on understanding the content and underlying processes of the material being studied are said to have a learning or *mastery* goal orientation (Dweck & Legget, 1988; Midgley & Urdan, 2001; Ames, 1992; Ames & Archer, 1988; Wolters, 2004)

Productively persistent students are more likely to possess a mastery goal orientation. As they seek to understand the content and underlying processes of the material being studied, these students tend to seek out academic challenges and persist on difficult academic tasks (Pintrich, 2000; Shim, Ryan, & Anderson, 2008; Witkow & Fulgini, 2007; Wolters, 2004).

Performance orientation students may be driven to achieve success (referred to as a *performance-approach* orientation) or to avoid failure (referred to as a *performance-avoidance* orientation) (Elliot, 2005; Elliot & Church, 1997; Elliot, McGregor, & Gable, 1999). Both performance subsets have been linked with students preferring to engage in "easy" work in an attempt to avoid negative feedback and setbacks. These students are more likely to engage in self-handicapping behaviors (e.g. choosing tasks that are far beyond their capabilities) and spend less mental energy focusing on the task at hand in an effort to avoid failure and avoid appearing incompetent to others.

Self-Regulation

Self-regulation refers to the purposeful behaviors, cognitions, and motivational practices students employ as they strive to attain their learning goals (Zimmerman, 1989, 1990, 2000, 2002). These skills allow students to avoid distractions, stay on task, and navigate obstacles that may arise as on their academic achievement path. Self-regulated students are active throughout learning activities, mentally monitoring and exerting control not only over their actions but also over the cognitions, beliefs, intentions, and emotions that underlie those actions.

There are many models of self-regulation, but one leading conceptualization holds that learning proceeds through three phases – forethought, performance, and self-reflection (Zimmerman, 2000). In the forethought or planning phase, individuals select strategies they believe will be helpful in achieving their learning goals. This phase is heavily influenced by an individual's motivation beliefs (e.g. their self-efficacy, goal orientations, level of interest, and value of the task) and their analysis of the task at hand (e.g. what the task requires them to know and complete). In the performance phase, individuals deploy the selected strategies, and continuously monitor their task performance and comprehension. Finally, in the self-reflection phase, individuals evaluate the product of the performance stage, judging, reacting, and determining an explanation/attribution for the outcome. These evaluations feed forward into the forethought phase of the next iteration of the self-regulation cycle.

Productively persistent students practice healthy self-regulation habits including being willing and able to recognize when they are having a problem, devising plans for solving their problems, and assessing the impact of their actions (Zimmerman & Bandura, 1994; Zimmerman, Bandura, & Martinez-Pons, 1992; Zimmerman, Moylan, Hudesman, White, & Flugman, 2011). They are able to forego distracting activities in the short term in favor of pursuing tasks beneficial to attaining their long-term goals. Productively persistent students also use self-regulation processes to identify stressors in their environment and employ specific strategies to prevent negative thoughts and emotions, such as anxiety and stress, from affecting their academic performance.

How do these interventions work?

How is it that these time-limited interventions have such large, long-lasting effects? In sum, social-psychological interventions effectively improve academic outcomes when they:

- target students' subjective experiences in school
- are grounded in empirically proven methods of persuasion and attitude change
- initiate self-reinforcing recursive processes
- are appropriately timed

Social-psychological interventions are effective when they target students' subjective experiences in school.

Changing students' thoughts and feelings in and about school allows them to take greater advantage of their learning opportunities. These interventions help students believe that their efforts will increase their ability and competence, improve students' sense of belonging in a classroom community, foster a sense that success is possible and within students' control, and they cultivate the notion that classroom work is interesting or relevant to their lives. In conveying these messages, the interventions help students rewrite the way students think about themselves as learners and about their classroom environment. With an open mindset that they are capable learners in control of their academic outcomes who are welcomed in their learning environment, students are open to the new experiences and are much more likely to persist at academic tasks despite setbacks and to exhibit academic behaviors (like those comprised in the self-regulation cycle) that lead to learning and school success.

Social-psychological interventions are effective when they are grounded in empirically proven methods of persuasion and attitude change.

Successful interventions do not overtly discuss the underlying psychological theory or make students feel that they are participating in an activity in order to "fix" something about themselves. Direct instruction on these topics could lead students to develop a negative, deficit way of thinking about their capabilities. Rather, these interventions are indirect and have even been referred to as "stealthy" because participants are often unaware of how their own thought processes are altered as a result of their participation (Yeager & Walton, 2011).

In an intervention conducted by Aronson, Fried, and Good (2002), upper level college students were asked to write pen pal messages to younger college students wherein they endorsed the belief that intelligence is malleable and can be improved with effort. At the end of that academic year, students in this treatment group reported increased engagement and identification with school and had greater increases in their GPA (.23 points) than students in the control group who did not write letters. Instead of attending a lecture or being directly taught about fixed and growth theories of intelligence, this stealthy tactic allowed the participants to explore this concept on their own and incorporate it into their academic identity without feeling an authority was directing them to change their way of thinking. (For further discussion of this intervention, see additional information in the "Example Programs" section). Covert interventions like this allow students to attribute success to their own capabilities and minimizes the possibility that students will attribute successes to the guidance received in the intervention.

Social-psychological interventions are effective when they initiate self-reinforcing recursive processes.

Brief social-psychological interventions have long lasting effects because they tap into recursive processes that then self-generate to continue affecting students' behavioral, cognitive, and emotional engagement in their academic environments (Yeager and Walton, 2011). These interventions essentially stop downward spirals in performance by preventing past poor performances from leading to greater negative and maladaptive feelings (e.g. stress and threat) that could undermine future performance.

Social-psychological interventions work for students who have had weak, or negative prior experiences by getting them to suspend belief about their performance and be open to positive learning experiences. Once open to these positive experiences, students are able to take advantage of the experiences and receive positive feedback about their capacities as a student, thereby replacing their long-held maladaptive personal narrative with a belief that they can be successful students. This belief is then highly motivating and perpetuates itself in a process where students engage in experiences with an open mind and positive attitude that propels them to expend more effort in the face of those minor setbacks and challenges, ultimately reinforcing the positive mindset (e.g. expending effort impacts performance) that motivated the student in the first place.

Social-psychological interventions are effective when they are appropriately timed.

Students are especially vulnerable to forming negative mindsets and exhibiting poor academic behaviors during periods of transitions to new academic environments (Eccles et al, 1998). For example, students who attribute poor performance during normative transition periods, (such as from middle school to high school or high school to college) as indicating a lack of ability were more likely to drop out than students who attributed their poor performance to a lack of effort or use of incorrect learning strategies (Eccles et al, 1998). During transitions periods, students must navigate not only the changing context of school (e.g. navigating a new school building, having multiple teachers instead of just one) but they also struggle in defining their beliefs about themselves as learners as curriculum changes and performance expectations increase. Therefore, interventions should be timed to quell negative beliefs from taking hold in the first place.

Example Programs

There is no "*one right way*" to construct a program that fosters the thoughts, feelings, and beliefs in and about school necessary for increasing academic engagement and achievement. Some programs may be brief, lasting only one session, while other effective programs may be implemented over a longer time period. Key to a successful program is that underlying framework targets students' subjective experiences in school, is grounded in empirically proven methods of persuasion and attitude change, initiates a positive self-reinforcing recursive process, and is positively timed. To demonstrate the variability in program implementation, three examples of successful interventions are discussed. Each program discussion contains an analysis of what the program does and why the program is effective.

Academic Youth Development (AYD): A collaboration between The Charles E. Dana Center and Agile Mind

Academic Youth Development (AYD) is a research-based intervention aimed at reshaping students' academic identities and enhancing their engagement in their own learning process. AYD program content focuses on four main areas: fostering beneficial student beliefs and attitudes, increasing self-regulation, developing metacognition (the ability to be reflective about your own thinking), and enhancing classroom culture. AYD was originally piloted and implemented as a 14-day summer session and continuing in-class activities for Algebra I teachers and students throughout the school year. During its first year of implementation in 2008, 100 schools participated; since then, thousands of students and teachers across the

United States have participated in the program. Beginning in Fall 2012 AYD is expanding to provide an option for implementing the program during the school year only; this version of AYD will incorporate more teachers and students by covering program material during advisory periods while also embedding and reinforcing program content in their Algebra I class activities. AYD strategically targets students during Algebra I to stave off the dramatic decrease in mathematics motivation and achievement that historically plagues this course as students begin to struggle with more difficult content and higher achievement expectations.

AYD equips teachers with tools and strategies they can use in their daily activities as well as the underlying research supporting the intervention that they may otherwise not have been exposed to. Program evaluators have found significant gains in teacher's beliefs in the malleability of their own and their students' intelligence as well as in teacher's understanding that allowing students to work through challenging activities enhances their achievement (Harvey, Bush-Richards, Schneider, and Leach, 2012). This shift in teacher thinking allows them to support students as they struggle in a way that fosters an increase in student's confidence in their own abilities.

Using bright animations and hands on activities, the AYD program first addresses student beliefs about intelligence by concretely demonstrating how information is transmitted throughout the brain via dendrites and synapses. Students then view a series of animations that demonstrate that researchers believe that our brains have the ability to grow new dendrites when effort is exerted to learn new information. These animations simultaneously demonstrate how the brain works and compliment a larger class wide discussion of how this impacts students as they are learning. Teachers do not directly lecture that students should believe that their brains can grow when exerting effort to learn, rather, they simply present scientific research and let students draw on the information in their own way. By avoiding direct confrontation and questioning about what students believe, students are invited into the conversation and do not feel threatened, and therefore resist, changing their beliefs.

As the AYD program continues, students and teachers continually engage in hands on activities and demonstrations that illustrate and instill strategies students can use when they face challenges during their studies. Beyond content focused on addressing beliefs and thoughts about learning, AYD activities include challenging problem solving experiences constructed to help students discover that there is no one correct pathway to solving a complex problem. These problem-solving activities provide an opportunity for students to test out their new beliefs and develop a habit of trying new strategies based on changing task demands. Students emerge with a better understanding of how to plan, monitor, and evaluate their strategy use to meet their academic goals and manage their academic emotions.

Using pre- and post-questionnaires and interviews to examine changes in the attitudes, beliefs, and behaviors AYD targets, evaluators have found consistent gains in students' and teachers' beliefs that their mathematical intelligence will increase as the result of increased effort (Bush-Richards et al., 2011). Students also report that they are less likely to give up when frustrated by a math problem, less likely to study only the easy parts of a math problem, and are more confident in their mathematics abilities. Students also report a greater willingness to ask questions in class, a result corroborated by their teachers during end of the program interviews. Additionally, students participating in AYD also show significant growth on measures of adequate progress administered by their school districts (Academic Youth Development: Program and research update, 2011).

Malleability of Intelligence Empirical Research

In contrast the AYD program's deep embedding of program content in class instruction, researchers have also had success altering student beliefs in a series of short-term meetings outside of the classroom. Responding to research that indicates that negative stereotypes intellectual abilities impairs Black students' academic performance and their psychological engagement with academics, Aronson, Fried, and Good (2002) conducted an experiment to test whether or not encouraging a malleable theory of intelligence could be used to affect students' academic engagement and achievement outside the laboratory setting and create long lasting and influential attitude change.

To test these hypotheses, they created an intervention built on powerful social psychological and persuasion principles shown not only to change attitudes but also to help that attitude change persevere and easily come to mind again in the future. The intervention hinged on the ideas that attitude change can be fostered by getting people to advocate for a particular position in their own words, (the "saying-is-believing effect"), that making a public commitment or statement strengthens the resolve of that belief, and that incorporating personal experiences that validate that attitude helps those attitudes and beliefs be more accessible, more automatically activated, and more persistent over time because they are resistant to counter information.

In a series of three 1-hour laboratory meetings each spaced 10 days apart, two groups of college students wrote "pen pal" letters and a short speech about the nature of intelligence that were ostensibly being sent to encourage younger students in middle school. In the treatment group, the letter writers were supposed to encourage the idea that intelligence is malleable and participants were encouraged to talk about their own experiences as a student. In one control group, letter writers were supposed to write about multiple kinds of intelligence. A second control group of students did not participate in laboratory sessions (didn't write any letters) was used to gather belief and achievement data for comparison. Data about student attitudes and achievement were collected months after the laboratory sessions so that the attitudes and achievement outcomes for the treatment group could be compared to the two other groups to determine the long-term effectiveness of the intervention.

Researchers found that participants who wrote letters encouraging a malleable view of intelligence had overall college GPAs that were .23 grade points higher than both control groups by the end of the following school term. Results also indicate that as time passed, the difference between the intelligence beliefs of those who participated in the treatment condition (malleable view of intelligence pen pals) and the beliefs of those in the other two control conditions widened over time. Additionally, Black students in the treatment group also reported more enjoyment and engagement in school than Black students in either control group, effectively demonstrating the success of this intervention on halting a negative recursive process that could have been initially triggered by stereotype effect beliefs (Aronson, Fried, & Good, 2002). This study, while initially conducted in a controlled laboratory setting, demonstrates that strategically orchestrated programs can trigger far-reaching effects outside of the classroom and over time, thus demonstrating the powerful effect brief interventions can have on engagement and performance.

Out of School Context: AfterSchool KidzLit™

AfterSchool KidzLit (KidzLit) is a, "research-based academic enrichment program designed to help youth's reading motivation, capacity to read, thinking skills, and prosocial development in out-of-school time settings" (Developmental Studies Center, 2003). Created by the Developmental Studies Center in collaboration with Boys & Girls Clubs of America, The YMCA of the USA and youth development organizations in several major cities, KidzLit is operated at approximately 2,500 sties nationally, offering approximately 150,000 students in grades K- 8 opportunities to engage more fully in all aspects of the reading process. Participants hear books read aloud by adults, read with peers, and even have an opportunity to read on their own during 45 – 60 minute sessions offered throughout the school week. While the program's main focus is on enhancing reading participation, engagement, and skill, the program addresses important psychosocial aspects that develop reading confidence and encourage a sense of belonging in a community of readers.

Beyond simply reading books, KidzLit uses the stories contained in the books as a starting place for participants to begin talking about issues that matter to them. Participants discuss the stories with one another, looking at why characters behave the way they do, the choices they face, the advice they might need, and how these stories relate to their own lives. Leaders help make these ideas stick by helping participants explore these issues more deeply through art, drama, discussion, and journal writing. These shared activities help youth form stronger, closer relationships with peers and site staff Developmental Studies Center, 2003b).

Evaluation data gathered on the KidzLit program supports these ideas. In an evaluation of the KidzLit program, researchers found significant increases in amount of reading overall and significant increases in second and fourth graders' reading efficacy (overall feelings about their reading ability) and the amount of reading they did (Developmental Studies Center, 2003b). Additionally, fourth grade students who were reading more books also reported enjoying reading more. Results were not limited to academic outcomes, however. Positive, significant increases in concern for others and altruistic behavior - key social and ethical attitudes and behaviors targeted by the program – were found. Youth were also more deeply engaged in connection activities (e.g. art, drama, music), and demonstrated a greater ability to think critically, express ideas out loud, and understand themselves and others (Developmental Studies Center, 2003b).

The KidzLit activities help students recognize that they are part of an academic community of readers and increases their social connectedness to their peers and their teachers. As students feel a greater sense of belonging in this community, they open themselves to experiences through which they can enhance their competence. Participants build a history of positive mastery experiences with reading comprehension as they read books on their own and with their peers. This enhanced sense of self-efficacy allows them be more persistent in the face of adversity. These activities also foster participants' development of enhanced critical thinking and problem solving skills.

Implementation Consideration

Social-psychological interventions should not replace good instruction.

Social-psychological interventions help remove barriers to learning (e.g. low confidence, loneliness, etc.) and allow students to take advantage of existing learning opportunities. Therefore, student achievement is maximized when these barriers are removed and students are exposed to classroom contexts that include rich content, genuine experiences, and high-quality instruction (Yeager & Walton, 2011). Learning contexts cannot focus solely on fostering positive social-psychological mindsets, they also must contain the materials and resources necessary to challenge students to develop conceptual understanding and gain a deeper appreciation for content within these concrete experiences.

Limitations of Existing Research

Existing research has not established that these "magic bullet" interventions are the cause of the improved academic performance.

Many of the intervention studies were not constructed in a way that allows us to conclude that the intervention is causing a change in the psychological factor under manipulation in the intervention. Most studies focus on an observable academic performance or behavior (e.g. grades or attendance) as the outcome and compare the results of the experimental group (that receives the treatment) and the control group (that does not receive the treatment). While a difference in academic performance may exist between these two groups after the intervention, the study has demonstrated only that an intervention works. In order to demonstrate that the intervention works *because* it has changed a psychological factor, that factor needed to be directly and systematically measured and analyzed (Wilson, 2006). In the studies that do measure the psychological variable (e.g. self-efficacy, belongingness) before and after the intervention, results support that a change in the psychological factor has occurred and it is the factor that drives the expected differences in student performance (Farrington, et al., 2012). More research that systematically measures the psychological factors at play in interventions is needed in order to have a complete understanding of the underlying intervention mechanisms.

Little research on interventions that simultaneously target multiple mindsets and/or behaviors.

Most interventions focus on altering a single psychological factor; however, these factors do not occur in isolation and researchers have yet to conduct studies specifically aimed at disentangling the multiple effects that are simultaneously changing (Farrington, et al, 2012). There are interventions that target multiple mindsets and skills, but more research on the dynamic effects of the factors manipulated in these interventions needs to be conducted.

Speculative effects of social-psychological interventions on out-of-school activities.

Existing literature is rife with findings from classroom and school based interventions, but noticeably devoid of experimental evidence collected in out-of-school contexts. At best the in-school findings allow inferences regarding the impact these interventions have in out-of-school contexts. The conclusions drawn from the KidzLit program are based on evaluation data, not experimental evidence.

Conclusion

Social-psychological interventions offer a promising direction for instilling in students the mindsets, behaviors, and skills necessary for them to be productively persistent. These interventions offer an opportunity for students to rewrite their personal learning narrative by opening them up to opportunities during which they can re-evaluate their academic self-perceptions and begin thinking and acting as a productively persistent student. These thoughts then self-reinforce during subsequent positive academic experiences, halting the downward spiral that unwillingly befalls many students.

There is, however, more work to be done in order truly understand and harness the power of these interventions. Research establishing a direct relationship between changes in mindsets, behaviors, and skills of productively persistent students – believing that effort can improve intelligence, having confidence in their abilities to succeed in academic tasks, feeling like they belong in the classroom, understanding that their actions are directly responsible for their academic outcomes, valuing and finding schoolwork interesting, setting challenging yet realistic and attainable long-term goals, regulating their thoughts and behaviors in pursuit of these goals – and the specific intervention is necessary. So, too, is continuing to develop strong content and engaging experiences to accompany these interventions. Our understanding of how these interventions may function in out-of-school activities needs to be directly addressed in future research as well.

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Acknowledgments