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Chapter 13:

Motivation Interventions in Education:

Bridging Theory, Research, and Practice

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Abstract

In the current chapter, we consider the importance of adopting intervention methods to advance the impact that motivation research can have on educational practice. In Part 1, we consider the case for intervention research as a bridge between motivation theory and research, on the one hand, and practice, on the other. In Part 2, we review two different intervention approaches for conducting motivational interventions: targeted interventions and multi-component interventions. In Part 3, we provide a detailed, case study of each intervention approach. In Part 4, we offer our conclusions and recommendations for next steps.

Keywords: motivation, interventions, education, expectancy-value, students, research-practice gap, psychological cost, educational psychology

Motivation Interventions in Education:

Bridging Theory, Research, and Practice

> …the job of the educational psychologist is to psychologize about authentic educational problems and issues, and not simply to bring psychology to education, as if we were missionaries carrying out the Lord's work (Berliner, 2006, p. 23).

> To the extent that psychologists [are] willing to walk down a two-way street with educators, there is increased hope for realizing the long-held goal of applying the science of learning to education. Striving to achieve this goal is a worthwhile adventure that offers advantages both to educational practice and psychological theory (Mayer, 2012, p. 250).

The field of motivation research within educational psychology has been especially generative over the last several decades, in particular by producing theories, constructs, and tests thereof. However, this research productivity has not resulted in comparable benefits for educational practice (Berliner, 2006; Kaplan, Katz, & Flum, 2012). Our current methods have been unbalanced in favor of observational, correlational, and laboratory studies that often have implications for practice but do not end up changing practice. In other words, we have "brought psychology to education" by developing theories and constructs without regard for solving the practical problems of educators. Although helpful in advancing theory, this test-theory-first, solve-problems-second approach has served to exacerbate gaps between research and practice. Fortunately, there is an alternative.

In this chapter, we consider how intervention studies can help educational psychologists walk with practitioners and bridge the research-practice divide, particularly in the area of student motivation. In Part 1, we consider the case for intervention research as a bridge between motivation theory and research, on the one hand, and practice, on the other. In Part 2, we review two different intervention approaches for conducting motivational interventions: targeted

interventions and multi-component interventions. In Part 3, we provide a detailed, case study of each intervention approach. In Part 4, we offer conclusions and recommendations for next steps.

Part I: Motivation Research in Education: The Case for Interventions

As psychologists, we are trained in our earliest methodology classes that research is motivated by three major goals: to describe, predict, or explain human behavior. In addition, we are exposed to the major research methodologies that allow us to answer each of these goals, by using observational methods for description, correlational methods for prediction, and experimental methods for causation (or quasi-experimental methods for limited causation). Whereas each methodology has merit, many of our earliest undergraduate psychology courses in methodology are entitled experimental psychology, thus implying a preference or bias for one particular methodological approach over others (Perlman & McCann, 2005). But non-experimental methods hold an important place for initiating and advancing research. When little is known about a topic, one of the best starting points is to simply observe the phenomenon of interest to answer the question: "What is X?" For example, how many students feel self-efficacy and value for their math class? This in turn can quickly lead to explorations of how two or more observed phenomena are related to each other to answer a more sophisticated question: "Does X predict Y?" For example, what short-term and long-term educational outcomes are predicted by students' feelings of self-efficacy and value?

As a field, we have learned a great deal about important motivational variables through observational and correlational methods, and how those variables are linked to key adaptive student outcomes. Research on self-efficacy and value reveals that both generally decline as students progress through school (e.g., Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), and that self-efficacy and value predict unique educational outcomes. Self-efficacy is generally a

stronger predictor of performance outcome such as grades and standardized test scores, whereas value is a stronger predictor of continued course taking and interest in that subject (for reviews see Wigfield & Eccles, 2000; Wigfield & Cambria, 2010; this volume). Another benefit of adopting non-experimental methods, especially in real-world educational contexts, is when it is unethical or unrealistic to manipulate the behavior of interest (Harackiewicz & Barron, 2004).

However, the ability to establish causation and answer the question "Does X cause Y?" requires an experimental or interventionist approach, where a researcher can formally manipulate and introduce an independent variable to see the effect it has on an observable outcome (cf. Shavelson, Phillips, Towne, & Feuer, 2003). Finding the underlying cause is often seen as the pinnacle of research and the culmination of a research continuum that may start out as non-experimental but end with a clear causal test (Shadish, Cook, & Campbell, 2002). This also allows us to best answer to teachers and school administrators who ask us what they can change to increase the self-efficacy and value of their students. We want to be able to say if you do X, it will cause your students to have more of Y. Unfortunately, even though our earliest methodology courses emphasize experimental methods, as a motivational field, we have conducted far less work that would fall under either an experimental or interventionist approach.

In this chapter we address this shortcoming by reviewing the current state of intervention work that has been conducted in the field of motivation. We define an intervention as a manipulation implemented by an external agent (i.e., teacher, researcher) that was intended to change students' cognitions, emotions, and/or behaviors (Lazowski & Hulleman, 2013). As such, utilizing an intervention methodology does not require a randomized experiment. Instead, we consider intervention to be an umbrella term that includes a variety of methodological

approaches, including randomized experiments and design-based research (Kaplan et al., 2012), both of which are reviewed by Penuel and Frank in Chapter 3 of this handbook.

In a randomized field experiment (i.e., randomized control trial), the effectiveness of an intervention is tested in the field on a particular population of interest by randomly assigning individuals to either a treatment group or a control group. It is held as a gold standard for validating the effectiveness of the treatment free from biases that occur when participation is self-selected or non-random (Schneider, Carnoy, Kilpatrick, Schmidt, & Shavelson, 2005; Shadish et al., 2002). Design-based research is a general label for an emerging body of approaches in which researchers and practitioners work in iterative cycles in naturalistic settings to test and refine interventions to improve learning and instruction (e.g., Brown, 1992; Design-based Research Collective, 2003). Penuel and Frank (this volume) liken this methodology to engineering where prototype testing is at the center of learning what does and does not work. Qualitative and/or quantitative evidence are collected to test the success or failure of an intervention, and then a team reflects on that data to inform changes to the intervention for the next round of testing.

Although formal tests of randomized interventions are a great way to establish causality, they're not the only reason to conduct intervention research (Shavelson et al., 2003). In fact, an arguably more important reason to conduct intervention research is to operationalize our theoretical constructs as potential educational practices that boost motivation and learning. It is one thing, for example, to observe that students with higher self-efficacy or perceived value for math at the beginning of a course perform better and learn more at the end of the course. It is another thing, entirely, to recommend changes in teaching practices based on this observation. What should teachers do differently to increase students' self-efficacy and help them find value

in math? Should they change how they talk about student successes and failures? The grading structure? The content of what they teach? The types of learning activities they provide for students? The only way to make clear recommendations about what practitioners should actually do based on our theories and research is to develop recommendations for practice, and then systematically engage in intervention research to test their effects on student learning outcomes. It is in precisely these situations, when potential intervention ideas are being developed, that design-based studies and other types of quasi-experiments provide important information (Kaplan et al., 2012; Penuel & Frank, this volume; Shavelson et al., 2003). For example, how well received are the suggested learning activities by students? How easy are they to implement by teachers? How different are the recommendations from current practice? All these questions may best be answered outside of a randomized experiment.

The research methods selected have clear implications for the conclusions that can be drawn from the work (Barron, Brown, Egan, Gesualdi, & Marchuk, 2008; Harackiewicz & Barron, 2004). Most notably is the tradeoff between cause and effect (i.e., internal validity) and generalizability (i.e., external validity; Shadish et al., 2002). One reason researchers choose to study phenomenon in laboratory settings is to gain experimental control to isolate the variables of interest, while holding extraneous variables constant. Although helpful in establishing internal validity, a laboratory setting is subject to artificiality that threatens generalizability. Similar challenges exist even for randomized field experiments, which are often forced to sacrifice external validity in order to establish cause and effect (Schneider et al., 2005).

Researchers in the field of social psychology have referred to this tradeoff as the social psychologist's dilemma (Aronson, Wilson, & Brewer, 1998). Partially because we were both trained as experimental social psychologists, we have been inspired by Cialdini's (1980;

Mortensen & Cialdini, 2010) challenge to the field. He argued that far too many social psychologists worked exclusively in laboratory research settings to test theoretical ideas. He noted this was especially problematic when the laboratory setting was artificial and overly controlled. Instead of trying to capture effects in the lab, he suggested that research efforts were better spent studying effects that already appear to be powerful in naturalistic settings. As an alternative approach, Cialdini proposed the concept of full-cycle social psychology. Hypotheses about phenomena should first be derived from observing that phenomena naturalistically in the real world. Then, research should be conducted in a controlled laboratory setting to determine the causes for why it might occur. Finally, verification should be continued back in a field setting, which often generates new hypotheses to start the cycle anew. By starting and ending in naturalistic field settings, Cialdini argued we would have a better model for theory-building and theory-testing, integrating both basic and applied research to solve real-world problems.

Our colleague, David Daniel, makes a similar plea when writing to learning scientists in his field of cognitive psychology (Daniel, 2012). In response to the call for widespread adoption of laboratory-based research findings (Roediger & Pyc, 2012), Daniel argued that a systematic "vetting" process is needed to verify if laboratory-based findings translate to actual, real-world classroom settings. Daniel proposed five steps to evaluate whether we can take a laboratory finding and apply it successfully to change practice in the classroom:

1) Begin with exploration in the lab to find *promising findings*
2) Move to careful experimentation in select classrooms to yield a *promising principle*
3) Develop and design classroom/teacher-friendly methods integrating *promising principle* into everyday *promising practice* and to help ensure the fidelity of the intervention

4) Continue coordinated experimentation in more diverse and complex classroom settings to yield teaching *best practice*
5) Disseminate and continue refining *best practice*

Others have raised similar concerns about the broad application of laboratory findings to the field (Dunlosky & Rawson, 2012; Mayer, 2012; Pellegrino, 2012). In motivation research, Pintrich (2003) made a call for a motivational science approach that focused on use-inspired research; that is, research inspired by practical questions, grounded in theory, and guided by systematic inquiry. Writing over a decade ago, Pintrich identified motivation research that had established the first two steps of Daniel's (2012) process. Pintrich identified five motivational generalizations (step 1) that yielded 14 design principles for classroom instruction (step 2, see Table 2, p. 672). However, motivation researchers have been less fruitful on the last three steps of Daniel's process, and have been unable to develop promising and best practices.

It is within this context that we highlight intervention research as a crucial methodological tool in bridging the research-practice gap. We do not propose that interventions should be the only focus of motivational researchers, nor do we argue that all interventions must be tested using randomized field experiments (Shavelson et al., 2003). Rather, as noted in the beginning of our chapter, research methods in motivation have been unbalanced, heavily favoring observational, correlational, and laboratory designs. Further, in order for interventions to provide effective direction for educational practice, interventions need to be use-inspired (Pintrich, 2003) and focused on solving practical problems of educators (Berliner, 2006; Kaplan et al., 2012). They also need to be guided by theory, of which the field of motivation has plenty. In the following sections, we review the current state of motivation interventions in education, and highlight two different intervention approaches that hold promise for impacting practice.

Part II: Motivation Interventions in Education: An Overview

Two main approaches to interventions grounded in motivation theory exist in the research literature. First, there are targeted interventions that leverage precise psychological mechanisms to enhance subsequent learning outcomes (for reviews see Lazowski & Hulleman, 2013; Yeager & Walton, 2011). Targeted interventions tend to be briefer in duration and focus on one or two components of motivation. Second, there are more comprehensive interventions that integrate multiple motivation components and often leverage motivation alongside specific curricular content (e.g., literacy) or pedagogical practices (e.g., cooperative learning) to enhance specific academic knowledge and skills (e.g., Guthrie, Wigfield, & VonSecker, 2000; Martin, 2008).

Targeted Motivation Interventions

We have organized targeted student motivation interventions into four main areas that synthesize the constructs that motivate students in classrooms. Three of the areas are adapted from Pintrich's (2003, p. 627, Table 2) review of motivation research in education: expectancy and control beliefs, interest and value, and goals. To these we add the fourth area of research that has re-emerged in the decade since Pintrich's article was published: the psychological costs of engaging in academic tasks (Barron & Hulleman, in press; Eccles et al., 1983), such as the anxiety and stress that students face when they experience fear of failure or stereotype threat (e.g., Steele, 1997). Below, we offer some exemplar intervention studies within each of the four areas, with an emphasis on interventions implemented in the field as opposed to those tested within the laboratory.

Expectancy and Control Beliefs Interventions. In general, this category of interventions helps students feel more confident to learn and achieve in a specific academic context and to be in control of producing their achievement outcomes. Within the research

literature, there are a number of associated constructs that have been investigated under this umbrella, including the perceived competence to perform specific academic tasks (e.g., self-efficacy, competence beliefs), to obtain a specific performance level (e.g., expectancies, outcome expectations), perceptions of the reasons students succeed or fail on academic tasks (e.g., attributions), and how much control they have to create a positive outcome. Although numerous theoretical approaches exist (Bandura, 1997; Eccles et al., 1983; Pekrun, 2006; Skinner, 1996; Weiner, 2010), the general idea is that students who believe they have more expectancy and control over their behavior and learning are more successful. For example, Weiner (1972) proposed that students attribute success and failure on academic tasks to ability, effort, perceived task difficulty, or luck. Adaptive attributions involve ascribing success to more stable factors (e.g., ability) and failure to less stable factors (e.g., effort, task difficulty). If individuals attribute success to a less stable factor (e.g., good luck) or failure to a more stable factor (e.g., lack of ability), then they will be uncertain about future success.

For example, Dweck's (1999) theory about the malleability of intelligence posits that students who have a growth mindset (i.e., belief that intelligence increases over time by engaging in challenging learning activities) are more confident and learn more than students who have a fixed mindset (i.e., belief that intelligence does not change over time, regardless of effort or experiences). By helping students understand that being challenged can facilitate their learning, an intervention that targets growth mindsets enhances confidence in the ability to learn and achieve performance outcomes. Blackwell, Trzesneiwski, and Dweck (2007) developed an eight-part intervention to enhance growth mindsets in classrooms. Six of the one-hour sessions instructed students on the latest research on how the brain develops and grows. Two additional one-hour sessions focused on helping students understand that their brains can grow through

persistence through difficulty and using appropriate learning strategies. Students who were randomly assigned to the mindset intervention had higher academic performance compared to those in the control condition. Other versions of the intervention replicated this effect in high school and college students (e.g., Aronson, Fried, & Good, 2002).

In addition to growth mindset, interventions that directly train students to think differently about the causes of their success and failure have been shown to be effective. For example, intervention work aimed at changing students' perceived control have focused primarily on changing cognitive attributions. Many of these interventions provide students with training about ascribing academic success to things that are within their control (e.g., effort) and that academic difficulties can be overcome. These control-enhancing interventions have been found to be successful in increasing perceived academic control, which in turn mediate effects on improved academic motivation and achievement outcomes (e.g., Hall, Hladkyj, Perry, & Ruthig, 2004; Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010). Furthermore, many of these intervention studies sought to alter the attributions that low performing students made regarding their academic achievement from one of low ability to one underscoring the importance of effort. These shifts in attributions have improved course grades (e.g., Boese et al., 2013), exam performance (e.g., Struthers & Perry, 1996), and standardized test scores (e.g., Wilson & Linville, 1985).

The perception of choice can also enhance students' perceived control, motivation, and subsequent learning outcomes (Lepper & Henderlong, 2000). For example, Patall, Cooper, and Wynn (2010) randomly assigned high school students to receive a choice of homework assignments or no choice. Students in the choice condition had higher self-reported intrinsic motivation and perceived competence, and also performed better on the unit exam, than students

in the no choice condition. Vansteenkiste and colleagues (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004) randomly assigned college students to conditions that appeared to have more or less choice. The perceived choice condition boosted students' depth of processing, persistence, and test performance compared to the no-choice condition.

Finally, Haney and Durlak (1998) reviewed the literature on self-efficacy interventions in both academic and clinical contexts, and found them to be effective at enhancing children's subsequent behavioral (e.g., teacher ratings of student classroom behavior), personality (e.g., self-report measures of depression), and academic outcomes (e.g. standardized test results).

Value and Interest Interventions. This category of interventions targets students' perceptions of the reasons why they see value and meaning in an academic activity. Pintrich (2003) proposed separate categories for interest and value constructs, but we see the two as inextricably linked in that value is an important component of interest (cf. Hidi & Renninger, 2006). A number of theoretical frameworks outline the importance of value and interest, including the expectancy-value framework (e.g., Eccles, 1983), self-determination theory (Deci & Ryan, 1985), and interest theory (Hidi & Renninger, 2006). Students could perceive value for an activity because it is fun and enjoyable (e.g., intrinsic value, interest, intrinsic motivation), an important part of their sense of self (e.g., attainment value, integrated regulation), a means to attaining an important current or future goal (e.g., utility value, identified regulation), a way of pleasing others (e.g., introjected regulation), or a way to obtain a reward or avoid a punishment (e.g., extrinsic motivation) (Hulleman, Barron, Kosovich, & Lazowski, in press).

Interventions that focus on intrinsic value tend to identify tasks and activities that students find interesting and intrinsically motivating, which are then compared to those that are less interesting and enjoyable on various learning outcomes. This research generally finds

support for using interesting tasks as beneficial for interest and value, as well as learning outcomes such as depth of processing, attention, and achievement (e.g., Ainley, Hidi, & Berndorff, 2002; Schaffner & Schiefele, 2007; for a review see Hidi, 1990). Field interventions that target utility value tend to emphasize the usefulness and relevance of learning material for the student's present and future life, and have found that these interventions enhance both intrinsic motivation and achievement (e.g., Hulleman & Harackiewicz, 2009; Oyserman, Terry, & Bybee, 2002; Yeager et al., 2014). Interventions focusing on extrinsic motivation demonstrate that tangible, extrinsic rewards can undermine students' motivation to engage in academic tasks, particularly if the rewards are unrelated to future task engagement (e.g., Marinak & Gambrell, 2008), if the task is already interesting to students (e.g., Deci, Koestner, & Ryan, 2001), and are perceived as controlling or are expected (e.g., Reeve et al., 2002). However, rewards that contain some informational value, such as providing feedback on performance quality, can be less undermining for future motivation and performance (Pintrich, 2003).

Goal Interventions. This category of interventions targets the goals that students set for themselves in the academic context. In the academic literature, goals have been approached from a variety of perspectives. Goal-setting researchers examine the specific, target goals students can set for performance, such as answering a specific number of math problems correctly (Harackiewicz & Sansone, 1991; Locke & Latham, 2002). Achievement goal researchers focus on the reason behind the goal pursuit, such as whether students are trying to learn and develop skills (mastery goals), perform better than others (performance goals), or achieve a set performance level (outcome goals) (for a review see Senko, Hulleman, & Harackiewicz, 2011). Other researchers have focused on the process of goal pursuit, and how developing specific behavioral plans can facilitate goal achievement (e.g., Gollwitzer, 1999; Oettingen, Chapter 9).

Although the observational and laboratory experimental research on goals in academic contexts has been prolific (for reviews see Elliot, 2005; Harackiewicz, Barron, & Elliot, 1998; Pintrich, 2003; Senko et al., 2011), the field testing of achievement goal interventions in actual education contexts has lagged behind. Anderman and colleagues (1999) observed differences between two middle schools, one that was more mastery-focused and one that was more performance-focused. Maehr and Midgley (1996) report on the design of an intervention intended to reform an entire middle school to utilize more mastery-focused practices. However, no empirical results of the intervention are reported. Linnenbrink (2005) classified teachers as being more mastery-focused, performance-focused, or both goal focused, and then structured small-group activities in each classroom to be consistent with the teacher's observed achievement goal profile. This quasi-experimental design revealed that students whose teachers and cooperative learning groups emphasized learning strategies consistent with both mastery and performance goals had the best outcomes. Muis, Ranellucci, Franco, & Crippen (2013) manipulated the feedback that undergraduate students received based on achievement goal theory. Undergraduate students were randomly assigned to receive quiz feedback that emphasized the importance of learning and improvement (mastery), demonstrating individual competence and high scores compared to others (performance), both improvement and besting others (combined mastery and performance), or simply received their quiz score (control). The results indicated that performance feedback increased academic performance relative to control and mastery feedback.

In contrast to the paucity of interventions inspired by achievement goal research, there have been several interventions designed to test whether helping students develop specific behavioral plans facilitates goal attainment and learning outcomes. In a series of field studies,

Gollwitzer and colleagues tested a series of interventions that helped students commit to specific goal-related behaviors at specific times and locations (i.e., implementation intentions; Gollwitzer, 1999). In one study, undergraduate students were asked to complete a report over winter break. Students who were randomly assigned to committing to a specific time and place to work on the report were more likely to complete the report than those who were simply asked to commit to turning the report in by a specific date (Gollwitzer & Brandstatter, 1997). This intervention approach has been adapted and found to boost effort and school performance with elementary, middle, and high school students (e.g., Gollwitzer, Oettingen, Kirby, & Duckworth, 2011). Similarly, Morisano and colleagues (Morisano, Hirsh, Peterson, Pihl, & Shore, 2010) developed an online goal setting program that guides students through steps for setting personal goals with detailed strategies for achievement. In comparison to a control condition that received questionnaires about positive psychology and wrote about past experiences, students randomly assigned to the goal setting condition demonstrated higher academic performance and retention.

Psychological Cost Interventions. This category of interventions targets the negative aspects of engaging in academic tasks often referred to as psychological cost (Barron & Hulleman, in press; Eccles et al., 1983). One psychological cost that can occur in academic settings is when students identify with a group that is stereotyped to underperform (e.g., girls aren't as good as boys in math). Known as stereotype threat, this cost can undermine academic performance and persistence, resulting in a sorting mechanism that reduces minority success and completion rates in high school and college (Steele, 1997). An intervention designed to ameliorate this perceived threat has been developed and tested by Cohen and colleagues (e.g., Cohen, Garcia, Apfel, & Master, 2006; Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009). Students randomly assigned to the affirmation condition wrote about their top most

important values, whereas students assigned to the control condition wrote about their least important values. By writing about their most important values, students affirmed core aspects of themselves, which serves as a buffer against threats occurring in another domain. In a sample of 7th grade students, the values affirmation intervention reduced the black-white achievement gap by 40% (Cohen et al., 2006). In a two-year follow-up, the benefits of the intervention were particularly acute for low-achieving black students who increased their performance by 0.41 GPA points relative to the control group (Cohen et al., 2009). This intervention effect has been replicated with other minority groups, such as Latino American middle school students (e.g., Sherman et al., 2013) and first-generation college students (Harackiewicz et al., 2014).

In addition to identity threat, students can also experience psychological cost if they feel anxious about not belonging or fitting in with other students. These feelings of belonging uncertainty can lead to students withdrawing from the academic experience and subsequently poorer academic outcomes. In a series of studies, Walton and Cohen developed an intervention targeting students' feelings of belonging (Walton & Cohen, 2007, 2011). In one study (2011), students randomly assigned to the intervention condition read results of a survey and quotes from other students that emphasized that everyone struggles with some aspects of college initially, but that these initial difficulties were temporary. In essence, students learned that there were other students like them who also felt like they did not fit in, and who eventually succeeded in college. Their results indicated that African American students, who were more likely to be uncertain about belonging, benefited with increased GPA and self-reported health and well-being.

Finally, students also experience psychological cost when they become highly anxious in testing situations. The cognitive component of anxiety, worrying, taxes working memory and undermines student performance on quizzes and exams. Several writing interventions have been

developed that target the cognitive component of worry in testing situations. For example, Ramirez and Beilock (2011) randomly assigned high school students to write about their exam-related worries (intervention condition) or to write about something not related to the exam (control condition). Highly anxious students in the intervention condition outperformed those in the control condition. Similarly, Jamieson, Mendes, Blackstock, and Schmader (2010) developed an intervention that helped students reappraise their pre-exam arousal and anxiety as a facilitator of performance. Undergraduates in the reappraisal condition outperformed their peers randomly assigned to the control group on the GRE math exam several months later.

Summary. Our review of targeted interventions highlights there is a growing body of intervention studies now being conducted that operationalize motivation constructs in field settings and successfully enhance educational outcomes. A recent meta-analysis of over 60 motivation interventions in education contexts indicates that these interventions have an average effect size of over half a standard deviation (Lazowski & Hulleman, 2013). This research evidence, which demonstrates that targeted psychological interventions can have significant and meaningful impacts on students' educational outcomes, should energize the field to translate theoretical constructs into interventions that can lead to changes in educational practice.

Multi-Component Motivation Interventions

Thus far, we have reviewed interventions that target a single motivational construct or component. However, to be maximally effective, an intervention may need to address multiple facets of the student experience. These interventions could target multiple motivational constructs, or these interventions could include pedagogical elements that target particular types of learning, such as reading or mathematics. As a group, such multi-component interventions have received less experimental evaluation in the literature, so the associated empirical base is

not as strong. Below, we review two promising examples of multi-component interventions in the literature that address motivational processes to enhance student learning outcomes.

A multi-component intervention developed by Andrew Martin provides an example of comprehensive motivation intervention. Designed using an integrative motivation and engagement framework known as The Wheel (Martin, 2008), this intervention targets students' adaptive and maladaptive behaviors and cognitions. Delivered over the course of 13 modules, students' are guided through instruction on the 11 aspects of the wheel: self-efficacy and mastery (expectancy and control beliefs); valuing (value and interest); anxiety, failure avoidance, uncertain control, self-handicapping, and disengagement (cost); and persistence, planning, and task management (learning skills). Initial quasi-experimental results indicate that the intervention boosted students' self-reported motivation, maladaptive cognitions, and persistence.

The Concept-Oriented Reading Instruction (CORI) intervention provides an example of a multi-component intervention that combines motivational aspects with reading strategy instruction. Developed by John Guthrie and Allan Wigfield, CORI links reading fiction and non-fiction books to science activities (Guthrie et al., 2000). This reading program is organized into thematic units designed to target five motivational processes: self-efficacy and mastery goals, perceived autonomy and intrinsically motivating activities, and collaborative work that provides social support for learning (Guthrie, McCrae, & Klauda, 2007). A meta-analysis of 11 quasi-experimental studies demonstrates that the CORI intervention improves students' reading strategy use, self-reported reading motivation, and achievement (Guthrie et al., 2007).

Certainly, there are additional interventions in the literature that may indirectly impact motivation, but that were not designed to function primarily through motivation mechanisms. For example, in a special issue of the *Educational Psychologist* edited by Wigfield and Wentzel, the

authors of different articles discuss school-wide reform efforts to create positive social and emotional climates for children (Juvonen, 2007), small learning community reforms (Felner, Seitsinger, Brand, Burns, & Bolton, 2007), and social skills training for aggressive children (Hudley, Graham, & Taylor, 2007). Such interventions connect to literature on social-emotional interventions (for a review see Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011), and indirectly target motivation through instruction in social and emotional skills (e.g., Brackett, Rivers, Reyes, & Salovey, 2010), rather than by directly targeting motivation as the primary mechanism of change (Rimm-Kaufman & Hulleman, in press).

Part III: Motivation Interventions in Education: Two Case Studies

In this section, we present two case studies of how to develop and test interventions designed to address an important problem of practice. We present these as in-depth exemplars of the important role of interventions in bridging the research-practice gap in the psychology of education. The first case study stems from our work to enhance the perceived utility value of learning specific academic content. The second case study stems from the Carnegie Foundation for the Advancement of Teaching's work to address student success rates in community college by altering the pathway through which students complete developmental mathematics courses. We conclude each case study by highlighting implications for theory, research, and practice.

The Utility Value Intervention

The utility value intervention is grounded in the expectancy-value framework of student motivation (Eccles et al., 1983). The motivation intervention was inspired by a practical problem: How does a first-year, graduate teaching assistant increase the motivation of his undergraduate students to learn statistics? One intuitive method of engaging students in the learning process is to increase the value of educational topics – that is, the personal relevance

and utility of school material – to students' lives. In the expectancy-value framework, student motivation to learn is a function of two components: how well we expect to do on the task (expectancy) and how valuable the outcomes of task engagement are perceived to be (value).

Faced with the challenge of students who lack value for statistics, an obvious way to help students discover how the statistical techniques they were learning applied to their lives in some way (utility value). This seemed more plausible than convincing students that learning statistics was fun (intrinsic value) or an important part of their identity (attainment value). In addition, non-experimental work has revealed that utility value was predictive of both performance and interest in coursework (e.g. Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Simons, Dewitte, & Lens, 2003). As a result, we designed a laboratory study to examine whether the theoretical construct of utility value could be enhanced through intervention and thereby increase motivation for learning. In this initial study (Hulleman, Godes, Hendricks, & Hulleman, 2010, Study 1), undergraduate psychology students were brought into the laboratory to learn a new method of computing arithmetic using mental math techniques rather than relying on paper and pencil or calculators. Before the learning session, participants were randomly assigned to one of two conditions. In the experimental condition, participants wrote about how a mental math technique applied to their lives in some way. In the control condition, students wrote a summary of how to use the technique. The findings revealed that students who wrote about the personal relevance of the technique reported more utility value for math at the end of the session, and were more interested in learning more mental math techniques, than participants in the control condition. These findings were especially true for students who had lower math expectancies.

Buoyed by these initial results from the laboratory, we conducted three randomized field experiments in classrooms. First, we replicated these results in an introductory college

psychology class and found that students who wrote about the relevance of what they were learning were more interested in psychology at the end of the semester than students in the control condition (Hulleman et al., 2010, Study 2). Students in the utility value writing condition maintained their interest in psychology over time, whereas students in the control writing condition exhibited a decline in interest across five time points in the semester (Harackiewicz, Hulleman, & Pastor, 2009). These results were replicated in 10 high school science classrooms (Hulleman & Harackiewicz, 2009). In this case, we found that the intervention enhanced both academic performance and subsequent interest in science for low-performing students in the utility value writing condition compared to the control writing condition. Third, we replicated these results in an unpublished study in an undergraduate statistics course (Hulleman, An, Hendricks, & Harackiewicz, 2013). This time, we found that low expectancy students in the utility value writing condition intended to take more statistics courses in the future than those in the control writing condition. Across all three studies, the findings were particularly evident for students who had low performance expectations at the beginning of the semester or who performed poorly on initial exams.

These four studies led us to consider whether we could enhance the perceived utility value for learning specific content outside the classroom. This time, the practical problem was the leaky academic pipeline in science, technology, engineering, and math (STEM). Specifically, students' lack of preparation in high school leads to a severe drop in interest in STEM majors and careers in college and beyond (Simpkins, Davis-Kean, & Eccles, 2006). Inspired by the potential role that parents play in students' educational trajectories (Jodl, Michael, Malanchuk, Eccles, & Sameroff, 2001), we developed an intervention that encouraged parents to talk to their children about the utility value of math and science (Harackiewicz, Rozek, Hulleman, & Hyde,

2012). Our thinking was that parents, as key socializers and influencers of their teenagers' course-taking decisions in high school (Eccles, 1983), could benefit from the knowledge of how taking math and science courses in high school was relevant to their children's lives. This intervention was delivered via two brochures mailed to parents, plus access to a website, while their children were in 10th and 11th grade. The results revealed that students of parents who were randomly assigned to receive the intervention took nearly one additional math or science course in their last two years of high school than students of parents who did not receive the materials.

Implications for Theory and Research. This research supports the expectancy-value framework proposed by Eccles (1983) that postulates that motivation is partially determined by the extent to which individuals ascribe meaning and value to activities. First, the relevance intervention, which encourages students to discover the connections between their lives and their topic of study, is effective because it encourages students to see greater purpose and utility in what they are studying. This affirms the basic tenets of the theoretical framework.

Second, our results reveal causal relationships between theorized constructs and outcomes across different contexts and age groups. Despite the extensive body of research within the expectancy-value tradition, little of that research has been experimental. We do not dismiss the importance of non-experimental work. In fact, non-experimental work has been important for the development of theory, and observing and assessing student motivation within real-world contexts. However, additional experimental tests of theory offer a more rigorous test of the theory, moving beyond the information that can be learned from interviews, observations, and correlational studies.

Third, when experimental studies are conducted, unexpected or counterintuitive findings can be revealed that diverge from non-experimental findings. For example, although not

explicitly stated by Eccles'(1983) expectancy-value framework, the overwhelming majority of research within this framework in educational psychology has focused on the independent, main effects of expectancies and values on learning outcomes (cf. Nagengast et al., 2011). The findings from this non-experimental work imply that value interventions, if they work, should universally apply to all students. In contrast, our results challenge how expectancies and values contribute to motivation by revealing an interaction between value and expectancy. In our studies, we found that the relevance intervention was most effective at increasing student interest and achievement for those with lower expectancies. Further, we find that low expectancy students who are explicitly told why an academic activity is important to their lives demonstrate worse learning outcomes (e.g., Durik & Harackiewicz, 2007).

The take-away message is that care needs to be taken in terms of how value is influenced. Thus, it is through a combination of methodological approaches that we can best understand the phenomena that occur in schools, and the role that situational and personality factors play in sustaining and promoting optimally motivated behavior (Harackiewicz & Barron, 2004).

Implications for Practice. The utility value intervention work enables us to provide recommendations to practitioners about the effectiveness of interventions based on enhancing students' perceived value for the material. The effectiveness of this brief, low-cost intervention should be encouraging to practitioners wishing to enhance student motivation and learning. However, because the intervention was most effective for students with low perceived or actual competence, this may not be a one size fits all strategy (Durik et al., in press). Thus, our recommendations are not so simple as to say that utility value interventions are good for everyone. Instead, it is important to be mindful of individual differences when employing strategies intended to enhance motivation (cf. Berliner, 2002; Daniel, 2012). Further, the utility

value interventions presented here provide an exemplar case for teachers to consider including in their teaching practices. Variations of this intervention within different educational contexts can be made based on content area, teacher expertise, and student characteristics. Rather than providing the magic bullet for helping students discover value in course content, this intervention provides a blueprint for teachers to use within their own unique classroom contexts and students.

The Carnegie Community College Intervention

Directly targeting perceptions of value proved to be an effective approach to address the problem of disengagement in introductory statistics for the graduate teaching assistant, and also for high school science. However, can targeting a single construct, such as utility value, create change in a more pervasive and complex problem, such as low persistence and graduation rates in community college? Perhaps an intervention with multiple components is needed to address this more systemic problem. In the United States, students are enrolling in community college in ever increasing numbers, with nearly 13 million students enrolled in a community college in the Fall of 2012, and nearly half of all undergraduate students having received a community college degree (American Association of Community Colleges, 2014). However, as many as 54 percent of students in community colleges fail to reach college-ready math proficiency even with remediation through developmental curricula (Bailey, Jeong, & Cho, 2010; Le, Rogers, & Santos, 2011). Furthermore, students are taking and failing such "developmental" math courses (also known as remedial mathematics courses), aimed at preparing students for college-level math curriculum, as many as ten times (Bryk, Grunow, & Gomez, 2010). This has significant consequences for future employment opportunities, as many jobs today require a solid understanding of mathematical concepts (National Science Board, 2006).

This practical and significant problem inspired the Carnegie Foundation to develop a comprehensive intervention that included multiple components. The goal of the project is to raise developmental math completion rates from 5% to 50% within five years (Silva & White, 2012). Doing so requires addressing not only student motivation, but also the courses that students take, pedagogical practices, and assessment. As part of its on-going efforts to address wide-ranging educational problems in a unique way, the Carnegie Foundation employed an improvement science approach (Bryk et al., 2010), which is another variation of design-based research. The approach starts with a problem of practice, develops hypotheses based on evidence from the research world and the practice world, tests change ideas based on these hypotheses in a rigorous way, and scales what works. Based on improvement models in health care and business, this approach requires researchers and practitioners to work closely together at each step, including hypothesis generation, data collection, intervention development and testing, and scaling-up.

First, the course sequence for developmental math was revised through a partnership with Charles A. Dana Center at the University of Texas-Austin. The goal was to create a two-course sequence that students could complete within one academic year. The revised courses include developmental components that teach students learning skills and strategies, and encourage students to connect the material to the world around them (i.e., value). Next, students' motivation and strategies to persist through learning challenges, called productive persistence, was defined according to five general psychological constructs: study skills, expectancy beliefs, value, belonging, and faculty support of students' skills and mindsets. The conceptual model of productive persistence was developed iteratively through cooperation between psychological researchers and community college math faculty. The math instructors identified important gaps in student persistence and skills in the developmental math context, and the researchers

connected these skill and mindset gaps to current psychological theory and research. Improvement science methods were then used to develop and test psychological interventions that could be embedded within the course (i.e., the Starting Strong package). Associated measures of productive persistence were also created to fit within the logistical constraints of the math courses. An initial pool of nearly 1,000 items was reduced to 26 that could be completed within three minutes during students' weekly lab sessions, thus providing important data on student progress and responsiveness to interventions during the semester.

The initial results of this effort have been striking. In just the first year, the community colleges that participated in the Carnegie program raised their developmental math completion rates to over 50 percent (Silva & White, 2012). The work, started in 2008, is on-going. The ultimate goal is to continue to expand this work to other community colleges, and to increase the success rate far beyond 50 percent, utilizing iterative cycles of testing and revision.

Implications for Theory and Research. Because this is a multi-component intervention, it is difficult to isolate which factors are primarily responsible for the improvement. But that's not the focus of this effort. Instead, the most important goal is addressing the persistence problem. However, there are important lessons for theory and research. For example, Dweck's growth mindset intervention has now been scaled up in hundreds of community college classrooms, and is serving as a contributing factor to the success of the program. The work of the community college network demonstrates that psychological interventions, such as the growth mindset intervention, can be translated into practice when researchers and practitioners engage in collaborative work. This is an exciting development for other constructs and interventions grounded in motivation theory – rather than simply providing suggestive implications for teachers, there is real promise to directly influence educational practices. For example, current

research in the network is examining different ways in which instructors might reinforce student growth mindsets via daily interactions, email communications, and performance feedback (J. Myung, personal communication, October 1, 2014).

Implications for Practice. The initial success of the community college partnership highlights the promise of researcher-practitioner partnerships in general to impact practice, and more specifically for instructors to employ lessons from motivation research to facilitate student learning outcomes. Future work needs to continue to translate the burgeoning literature on motivational interventions into educational practices. Knowledge of motivation theory and research is accessible to practitioners if they are willing to work with researchers to translate promising principles into promising practices, and eventually best practices that can be implemented at scale (Daniel, 2012).

Part IV: Conclusion

Simply put, from a theoretical, research, and practical perspective, intervention studies facilitate our understanding about which interventions are most effective in improving educational outcomes in a way that observational and correlational research cannot. Whether the research design is experimental or not, this understanding can guide recommendations for educational practice based on appropriate scientific evidence. It is not enough to simply know that some motivation constructs are correlated with important student outcomes. What is needed are interventions, designed to target motivational constructs and processes, that in turn enhance educational outcomes. Importantly, when such interventions are guided by practical questions and developed in collaboration between researchers and practitioners, they have the potential to solve fundamental challenges of educational practice.

So, with such obvious benefits, why are such studies lacking in our body of motivation research? When reflecting on the differences between hard sciences and soft sciences, Berliner (2002) suggested this was a false dichotomy. Instead, he proposed that a better distinction might be easy-to-do science vs. hard-to-do science. Education research, as it turns out, may be the hardest science of all to do:

> We do our science under conditions that physical scientists find intolerable! We face particular problems and must deal with local conditions that limit generalizations and theory building – problems that are different from those faced by the easier-to-do sciences… In education, broad theories and ecological generalizations often fail because they cannot incorporate the enormous number or determine the power of the contexts within which human beings find themselves (p. 18-19).

Within educational research in general, and motivational research in particular, non-experimental methods typically are the easier-to-do science and interventions and experimental methods are the harder-to-do science. Conducting high quality intervention research requires time, money, and resources, especially when considering newer forms of intervention research that work in collaboration with educators. But with the right investments in how we train the next generation of educational psychologists and how we fund research, we can provide the necessary training and incentives to take up the call for this important work.

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