

Framing Experienced Difficulty and Uncertainty to Boost Academic Motivation

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Psychology)
in the University of Michigan
2014

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Abstract

In order for students to do well in school, they must take action to achieve their academic and career goals. Students may have the strategies necessary to succeed but may not enact them when the time is right because there is no cue that they should act now rather than later, and once they do act, their interpretation of experienced difficulty may derail efforts rather than encourage persistence. In three sets of experiments, I look at ways to frame experiences of un/certainty so that students see now is the time to work toward their academic goals, and ways to frame experiences of difficulty so that it is seen as implying that school success is an important goal. The first set of three experiments tested the prediction that feeling unsure about the path to one's goals can be motivating if accompanied by the feeling that one has the skills needed to make progress toward one's goals. Sense of un/certainty about the self and path were separately manipulated in college students. Feeling uncertain about one's abilities reduced the salience of academic and career future identities, but feeling certain about those abilities did not motivate action unless combined with a sense of uncertainty about the path as well. This combination increased planned study hours and actual goal-focused action, working on a resume builder instead of playing games. In the second set of three experiments, I provided children in school an interpretation of difficulty as signaling task importance; these students subsequently generated more school-focused future identities and strategies to attain them, and performed better on standardized intelligence and writing tasks. Children provided no interpretation of difficulty or an interpretation of difficulty as signaling impossibility of task success did not differ from each other in performance. The final two experiments provided students an interpretation of difficulty and assigned them to conditions implying they experienced difficulty as importance relatively more than others or that they experienced difficulty as impossibility relatively less than others. These students viewed investment in academics as more identity-congruent, planned to study more, and invested more time on a difficult task.

Chapter I

An Introduction

Just do it.

One of the likely reasons for the success of Nike's tagline is its simplicity and broad applicability. Just do it – in order to produce an outcome, you must take action. To win gold in the Olympics you must practice, to get ahead at work you must put in long hours, to do well in school you must study. It sounds simple enough. For any outcome, good or bad, something must be done. Hence, it should seem reasonable to conclude that for desired outcomes we should take action to achieve them. But that's not always what we do; we sleep through practice, we go home early on Friday, and we skip studying to socialize. For goals such as doing well in school, not taking action can have detrimental outcomes. Not working on school work, not investing the needed time, and quitting when things become difficult can lead to failing a test, repeating a grade, not getting into college prep courses in high school, having a weak college application, taking longer to finish college than expected, and missing out on a job opportunity. Thus, in order to make school success more likely, academic-focused action is needed.

In the current set of studies, I propose several ways that can encourage students to take academic-focused action. Action can be motivated by having students see school investment as identity-congruent and worth their time, by having students understand that while they have the capabilities to succeed, things may not go as planned so they should act sooner rather than later, and by having students see difficulty not as a sign to stop, but as a sign to keep working. Each of

these methods for motivating students can be executed using simple contextual cues and framings, demonstrating the situated nature of motivation. Focusing on schoolwork, taking action, and putting forth effort even when things are difficult will increase student chances of success in school.

Academic motivation and motivational arousal

A number of theories assume that the self and identity influence what someone is motivated to do, how they make sense of situations, and what actions are deemed appropriate (see Baumeister, 1998; Brewer, 1991; Carver & Scheier, 1990; Higgins, 1987, 1989; Oyserman, 2007). How one thinks about the self matters for subsequent behavior (e. g., Carver & Scheier, 1978). Self-regulation toward important goals is driven by comparisons of the current self (input function) to goals or standards of what one wants to be like (reference value), and action is taken to reduce the gap and bring one closer to salient goals (Carver, 2004). A number of theories of motivation have explicated what this process of moving closer to one's goals looks like for students in school. Indeed, theories of academic motivation abound. Early on, McClelland and colleagues (McClelland, Atkinson, Clark, & Lowell, 1953) attempted to understand the motivation one has to succeed, termed "achievement motive", by looking at responses on thematic apperception tests. Atkinson (1957; 1966) went on to develop a model of expectancy-value, in which motivation was determined by achievement motives (stable individual differences in the desire to strive for success), expectancies for success, and incentive values. When one recognizes a discrepancy between current attainments and a desired goal, one may work towards the goal or not depending on the multiplicative result of those three factors.

More contemporary conceptualizations of expectancy-value theories have been used to predict academic motivation and choice as well (Eccles, Adler, Futterman, Goff, Kaczala,

Meece, & Midgley, 1983; Feather 1982; 1992; Wigfield & Eccles, 1992). Expectancy-value theories see behavior as determined by the value of an outcome and the likelihood that properly executed behavior will produce the desired outcome. Expectancy-value theories have proven useful in understanding intentions to act and academic choices (see Wigfield & Eccles, 2000). Alternatively, instead of looking at whether a properly executed behavior will produce a desired outcome, self-efficacy theory first considers whether or not one believes he/she is capable of executing the desired behaviors as the driving force in motivation and action (social cognitive theory, Bandura, 1977; 1988; 1997). Efficacy expectations determine the subsequent behavior and persistence of the behavior, with the belief that then the enacted behavior will produce the desired outcome.

What these theories in particular have in common is a focus on motivational potential rather than motivational arousal (see Brehm & Self, 1989). Motivational potential is a relatively stable assessment of the amount of effort one will put forth on a task and is determined by expectations for success (as predicted by expectancy-value theories) and ability to perform the needed actions (as predicted by self-efficacy theories). Potential outcomes, their value, the needed effort, and associated difficulty are all stable features of a task. Yet contemporary theories argue that these processes should be contextualized and sensitive to situational cues (Ferguson & Bargh, 2004; Smith & Semin, 2004). Furthermore, motivational potential focuses more on the extent to and conditions under which one will act rather than on the production of actual behavior. Others have noted as well that expectancies and values (i. e., motivational potential) can remain constant while the tendency to act changes (see Kuhl, 1987). In other words, motivational potential is more concerned with whether or not one will be able to act. Since perception of an outcome as desirable and feasible does not guarantee action (see

Gollwitzer & Oettingen, 2012), my focus instead is on motivational arousal and the realization of action and engagement.

In the current work, I take an approach to motivation that instead focuses on how it operates in context and the actualization of instrumental behavior through motivation arousal. This approach functions on the premise that actions are adjusted to be contextually relevant and are influenced by what information is accessible at the moment of judgment (Ferguson & Bargh, 2004; Fiske, 1992; Oyserman, Elmore, Smith, 2012; Schwarz, 2007). Rather than examining the role of expectancies, efficacy, and motivational potential, I instead focus on motivational arousal, of which the purpose is the production of behavior (Brehm & Self, 1989), and the interpretation of experience, expecting motivation to be malleable and influenced by the information and affordances the situation provides. Whether or not students get going now, see difficulty as a sign to keep going or stop, and see school as worth their time are not solely determined by the task one is working on or by past experiences, but by how one interprets their experience in working on that task now. These processes are context dependent; situations do not always frame experiences in a way that spurs and sustains motivation and action, but can be constructed to do so. In making these predictions, I build on identity-based motivation theory, discussed next.

Identity-based motivation: A situated approach to motivation

Identity-based motivation theory (IBM, Oyserman 2007; 2009; in press) is a general model rooted in situated cognition that was designed to explicate the motivational processes behind decisions and outcomes. IBM first predicts that people are motivated to act in ways that feel congruent with salient and important identities. While these identities may feel stable, the self consists of an array of situated identities rather than a unitary self (see Cross & Markus, 1991; Swann & Bosson, 2010). Ergo, not only what an identity means in the moment but which

identities are salient and thus inform behavior is highly sensitive to situational cues. Thus, what feels identity-congruent in the moment and motivates action is dynamically constructed and often occurs automatically and outside of conscious awareness (Smith & Collins, 2010; Smith & Conrey, 2010; Smith & Semin, 2004, 2007). The dynamic construction of an identity in the moment is important, because salient identities determine what behaviors, strategies, scripts, and schemas come to mind and guide subsequent action. Hence, contextually salient information can have a profound impact on judgment and behavior (Schwarz, Bless, Wanke, & Winkielman, 2003; Wyer & Srull, 1989). This impact results in identity producing procedural and action readiness to act in identity congruent ways.

Cultural priming demonstrates the dynamic construction of identity. A common paradigm to active an independent or interdependent construal of the self is to have participants read a paragraph about a mundane activity and circle all the first person pronouns (see Oyserman, 2011). Experimenters manipulate whether the pronouns in the paragraph are first person singular (I, me, my) or first person plural (we, us, our). This manipulations influences salient identities and the subsequent construal one has of the self. Participants whose attention is brought to first person singular pronouns respond with an independent construal of the self, bringing to mind their traits and unique characteristics. Participants whose attention is brought to first person plural pronouns respond with an interdependent construal of the self, bring to mind social roles, relationships, and group identities (for a meta-analytic review, see Oyserman & Lee, 2008). What an identity means for the self is constructed in the moment.

Content of identity also matters for action in identity-congruent ways. African American middle school students were asked what it means to be a member of their racial group before or after working on a novel math task. Students who saw doing well in school as an integral part of

their racial identity performed better on the task when their racial group membership was brought to mind beforehand (Oyserman, Kimmelmeier, Fryberg, Brosh & Hart-Johnson, 2003). Additionally, this process is sensitive to contextual information. Destin and Oyserman (2009) gave a group of low-income students a graph with income organized by educational attainment, showing that individuals with more education earn higher incomes. Another group of students saw a graph with income organized by career, with individuals in professions requiring less education (musicians, athletes) earning higher incomes. Students in the first group exposed to education-dependent income graphs were more likely to do an extra credit homework assignment, showing that what doing schoolwork meant for their future self was influenced by the information presented. Moreover, the education-dependence of income for these students cued a readiness to act to ensure they have the level of education necessary to attain their desired outcome, in this case, a high income. That action started with the extra credit assignment. In sum, what identities come to mind is situationally-cued, the content of those identities matters, and we act in ways that fit with the content of salient identities.

The final tenant of IBM theory is that when working on a task feels difficult, that difficulty can be interpreted in one of two ways (IBM, Oyserman 2007; 2009; in press). The experience of difficulty can be interpreted as a sign that whatever is being worked on is impossible, not possible for people like one's self, and pointless to engage in. Since there is little chance for success, one should not persist on the difficult task. Alternatively, the experience of difficulty can be interpreted as a sign that whatever is being worked on is important, within one's reach, and worth one's time and effort. Since success on the task is important for one's self, one should work harder to overcome the difficulty. This last tenant of IBM has received the least direct empirical testing, and is a focus of the current work. More specifically, in the present set of

studies, I use the latter two tenants of identity-based motivation, that context can cue a readiness to act on important goals and that interpreting experienced difficulty as a sign of importance encourages sustained effort, to motivate action in students. Next, I discuss literature that suggests students may not be working toward their full potential.

A lack of action

Doing well in school, going to college, and getting a good job are all important self-goals for the vast majority of students (Oyserman & James, 2011). Because of this, the desired future identities most students have for themselves are dependent on their academic success. Thus, being a successful student should be a salient identity and goal to strive for. And with good reason, being a successful student for the most part pays off. Higher educational attainment results in higher economic growth and an increase in gross national product (Gylfason, 2001). Graduates of four-year colleges can expect to earn around 28% more than those with an associate degree, 53% more than those with only a high school diploma, and 96% more than high school dropouts (25-34 year olds, National Center for Education Statistics, 2010). White women who attended college are less likely to be single mothers when they give birth (8% versus 51%, DeParle & Tavernise, 2012). And high school dropouts earn about \$130,000 less over their lifetime while costing society over \$200,000 more in lost tax revenue and government expenditures. In fact, the U. S. government would receive \$45 billion from extra tax revenue and reduced costs of social programs (e. g., health, welfare) if the number of high school dropouts was cut in half (Levin, Belfield, Muenning, & Rouse, 2007). In short, more education would have substantial benefits at both an individual and societal level.

Yet despite the obvious benefits of education, approximately 15-30% of American students drop out of high school (Manhattan Institute for Policy Research, 2001), a third of those

who do graduate high school never enroll in college (Bureau of Labor Statistics, 2010), and currently less than 60% of first time enrollees in four-year colleges will graduate within six years (National Center for Education Statistics, 2013). In fact, the way *four-year* college graduation rates are measured, in six year increments, should be indicative that educational attainment for many falls short. In all, only about one third of Americans over the age of 25 have a college degree, and this number has only risen slightly in the past ten years (U. S. Census Bureau, 2011).

Many of the statistics pointing to lack of educational attainment are exacerbated for low-income, minority students, and male students. For instance, while percent with a college degree has risen (slightly) for all groups, the largest recent gain has been for Whites (28.7% held a college degree in 2001 compared to 34% in 2011, compared to an increase from 11.1% to 14.1% for Hispanics and an increase from 15.7% to 19.9% for Blacks, U. S. Census Bureau, 2011). Almost half of American Indian, Hispanic, and Black students do not graduate from high school on time, while only about 20% of White students fail to do so (Orfield, Losen, Wald, & Swanson, 2004). Students with less economic resources have a lower likelihood of graduating college than their more economically advantaged peers (Jackson, 2010). Males of every racial-ethnic group lag behind same-race women in high school graduation, with the biggest discrepancy often for Black males (Orfield, Losen, Wald, & Swanson, 2004). In addition, the gender discrepancy in college degrees has decreased from almost a four-percentage point male advantage to less than a percent advantage (U. S. Census Bureau, 2011).

Yet students want to do well in school; they aspire to and expect to be successful¹. For instance, when asked how far they expect to go in school, most U.S. eighth graders say they

¹ While some work aims to distinguish between aspirations and expectations, I do not, mainly because possible selves and desired future identities can both be something one aspires to and expects to achieve. In the current studies, possible selves measures are used, so it is difficult to

expect to attend college regardless of their current level of academic achievement, demonstrating that the expectation to go to college does not necessarily predict how hard one plans to work in school (Trusty, 2000). When asked to describe their future possible selves, which are images of both who one expects to become and who one expects to avoid becoming, students overwhelmingly focus on academic and career-focused possible identities (for reviews, see Oyserman, Elmore, & Smith, 2012; Oyserman & James, 2011; Seginer, 2009). Even low-income and minority students have school-focused future identities (Oyserman, 2007; Oyserman & Fryberg, 2006). In school districts where graduation rates are low, students still expect to go to college (Kao & Thompson, 2003; Oyserman & Destin, 2010). Nationally representative data show similar statistics; the majority (72%) of children from poor families have hopes of attending college (Panel Study of Income Dynamics Data, Elliott, 2009). High aspirations for educational attainment are present across racial lines (Kao & Tienda, 1998), with some studies finding the highest expectations among Black students (Mello, 2009). Very simply, American students do not suffer from low educational expectations, but at the same time, national education attainment statistics indicate that expectations fall short of actual attainment. What we are left with is an aspiration-attainment gap – a gap between what students expect to attain educationally and what they actually attain.

Despite the gap between expectations and attainments, the literature suggests that these high aspirations are not necessarily a bad thing to have. Markus and Nurius (1986) in their original conceptualization proposed possible selves (ideas of what one might become, would like to become, and is afraid of becoming) as links between cognition and motivation, serving as an

distinguish between aspired to and expected selves. Additionally, responses to questions about aspirations and expectations are highly correlated (Madeira, 2009). Throughout, possible selves, aspirations, expectations, future identities, etc. are all seen as academic outcomes and goals students work towards.

incentive for future behavior by providing a comparison with the current self (am I on track to become what I want to be like in the future or not). Indeed, having educational expectations have been linked to positive educational outcomes; children who expect to go to college are more likely to do so (Beal & Crockett, 2010; Elliot, 2009; Messersmith & Schulenberg, 2008; Ou & Reynolds, 2008; though some studies suggest the positive relationship between aspirations and attainments may be becoming weaker with time as unrealistic expectations increase, see Reynolds, Stewart, Macdonald, & Sisco, 2006). What this leaves us with is a gap between aspirations and attainments, but also a positive link between the two. So under what circumstances would we expect expectations and aspirations to predict educational outcomes?

In order to be better able to predict outcomes, expectations and aspirations should be concrete enough to be backed up by strategies. Strategies are essentially operationalizations of action, concrete steps one can take to achieve an outcome. For instance, the finding that low income (and minority) students may have attainment expectations just as high as other students is interesting because students in these low income contexts are less likely to come into contact with individuals in their neighborhood with either high occupational prestige or high levels of education (Eggers & Massey, 1992; Krivo, Peterson, Rizzo, & Reynolds, 1998; von Lockette, 2010; Wilson, 1996; Wilson, Tienda, & Wu, 1995). This problem is confounded with race (Wallace & Muroff, 2002). Ultimately, guides to success are less accessible in low-income contexts. White and middle-class students are more likely to have salient strategies for academic success via parents, teachers, and community members. Thus, individuals in low income contexts in particular are less likely to have salient examples of what it takes to do well in school, the necessary steps to get into college, and how to obtain a high prestige occupation; they may value education, but be less adept at getting there.

The literature supports this idea; Kao & Tienda (1998) find that compared to White and Asian students, Black and Hispanic students have less stable education aspirations from 8th to 12th grade. Black and Hispanic students, who are also more likely to be economically disadvantaged as well, have initial (8th grade) aspirations that are less concrete and more abstract. Low SES students also have more unrealistic ideas about paying for college and often feel less prepared (Olszewski-Kubilius & Scott, 1992). Alexander, Entwisle, & Bedinger (1994) demonstrate that both parent and student expectations for future school performance are more accurate for middle-class students, who correctly account for prior grades when making expectations, than for Blacks and low-income Whites, who fail to correctly account for prior performance. These studies suggest that students' low-income status makes it harder for them to know what it takes to get to college, leading to aspirations that are harder to follow through on (see also Rosenbaum, 1997). Moreover, other studies show that SES predicts aspirations (Mello, 2009); those with more resources have a better sense of what is out there and how to get it than their less advantaged counterparts. Yet it is likely important for students in low-income contexts, despite their circumstances, to have expectations for success that at least seem feasible to them, since seeing a goal as unfeasible leads to low commitment and investment in it (Gollwitzer & Oettingen, 2012).

Still, empirical evidence supports the idea that expectations and aspiration are more predictive of outcomes when concrete and backed up by strategies. Low-income minority students were randomized to participate in an experimental intervention designed to help them connect what they were doing now to where they wanted to be later in life. Students who participated in the experimental intervention developed more school-focused possible identities and strategies to attain them than students who did not participate in the intervention. These

students also did better in school over time, and the boost in their performance was mediated by the increase in possible selves and strategies (Oyserman, Bybee, & Terry, 2006). Results highlight that having academic possible selves is not enough, they must be linked with plausible strategies (see also; Oyserman & James, 2009; Oyserman, Bybee, Terry, & Hart-Johnson, 2004; Oyserman, Terry, & Bybee, 2002). Thus, expectations for success and academic-focused future selves do matter, but only when students have a way to get there. Similarly, focus groups with Latino youth point to the need for higher specificity in desired future identities (i. e., identities plus concrete strategies and steps to attain them) in order for these students to be successful (Yowell, 2000). This body of work demonstrates that all students are capable of having successful outcomes in school, but all do not take action to do so (Oyserman & James, 2009).

Having less abstraction and strategies to attain one's aspirations motivates action. Having concrete strategies makes taking action more likely (and easier) by organizing the steps and laying out the process necessary to achieve one's goal (Oyserman & James, 2009). It makes it much more transparent what has to be done, how, and by when. Possible selves and strategies serve a self-regulatory function by helping one maintain positive affect in pursuing an aspiration, behavioral focus, and action toward a goal (Oyserman, Bybee, Terry, & Hart-Johnson, 2004). Recent empirical work by Landau, Oyserman, Keefer, and Smith (in press) has shown that thinking about one's desired future along a path provides structure and organization and motivates students to work on academic goals above and beyond students who think about their future identity without a concrete structure. Implementation intentions also capitalize on planning out how goals will be pursued, i. e., a strategy. The concretization of the relationship between a situational cue and action details when, where, and how to act (see Gollwitzer & Oettingen, 2012; 2013). In short, strategies serve to provide details and organization, making

taking action easier. But even with desired identities and strategies in place, action may not be taken in the moment, and once action is taken, the experience of difficulty can derail action (Oyserman & Destin, 2010; Oyserman, Johnson, & James, 2011). So just having strategies is not enough, it must be clear that now is the appropriate time to employ those strategies, and once action is undertaken, that obstacles such as difficulty need not derail efforts. As detailed next, IBM provides a framework for making it clear that now is the time to act and that obstacles like difficulty can motivate one to keep going.

Taking action via IBM

To attain desired outcomes, one must have strategies to attain one's goals and then act upon them. For instance, if a student wants to do well on a test so that one day he will have a high enough GPA to gain acceptance into the college of his choice, he should study. But even when the strategies for success in school are present, they are not always carried out. Identity-based motivation suggests that this lack of mobilization of effort stems from first, important school-focused identities and strategies not being salient, second, failure to realize that the time for action is now rather than later, and finally, misinterpretation of difficulty on school tasks as a sign that school isn't something one is capable of. It should be noted that the problem does not seem to be that students are working at such a high level that they are unable to exert more effort. In fact, the literature suggests just the opposite. Focusing on college statistics in particular, American students attending four-year colleges spent about 24 hours studying per week in the early 1960s. Since then, time spent studying in college has been on the decline, with college students today putting in about half the time studying that their parents did, just 14 hours per week on average (while the recommended amount based on the average course load is closer 30 hours per week, Babcock & Marks, 2010). Studying is a non-trivial behavior; spending more

time studying in college is associated with earning more later on, and decreases in study time are associated with decreases in GPA (Stinebrickner & Stinebrickner, 2007). The decline in study time predates major technological advances (i. e., is not the result of students being able to do schoolwork faster due to technology such as computers), and is found across demographics and a variety of majors. The majority of students' time is spent socializing (Arum, Roksa, & Cho, 2011), and Arum & Roksa (2011) claim that by the end of their second year in college, almost half of students have made no substantial gains in reasoning, writing, or critical thinking skills, due to the dearth of time spent studying. Either college is too easy, or students are not working as hard as they could be.

According to identity-based motivation, one reason for the lack of effort is that action may not seem relevant for the current context and identity. Doing well in school may not be a salient part of one's identity in the moment, in which case the associated behaviors will not come to mind. For instance, Landau, Oyserman, Keefer, & Smith (in press) randomly induced students to think about their academic future self along a path or their social future self along a path. Thinking of one's academic future self along a path, but not their social self, elicited more academic motivation and increased effort on academic tasks. Thus, the identity must be salient for the relevant actions to come to mind.

More likely to be the issue, though, is that a student identity may be salient, but the context does not signal that now is the time to get going. Students in school may be continually reminded of their academic identity (psych major, 7th grader, honor roll student, etc.), but it may not be clear what to do and when. Nurra & Oyserman (2011) manipulated the perceived distance between the current and future self by presenting elementary school students with circles labeled "current self" and "future self" that were either far apart or close together. For students who saw

the circles close together, this implied that there was not much time between the two selves. These students worked harder on a subsequent assignment provided by their teacher. In other words, if the future feels close, students will be more likely to take action now. Finally, once students do begin working, they may experience difficulty. If they interpret this difficulty as indicating doing well in school is in fact not for them and not something they are capable of, they will disengage. The path is impossible. Destin & Oyserman (2009) exposed low-income minority middle school students to information that presented college as expensive or as attainable through financial aid. Those who saw the path to college as impossible (because of the expense combined with their lack of financial resources) expected lower grades and planned to spend less time on homework than other students. Low income contexts may chronically signal impossibility in attaining positive outcomes. Those students who learned about financial aid options, conversely, saw college as an important goal that they could attain through hard work. Thus, students have to see difficulty as a sign that the outcome is important and one should work harder in order to take (and continue) action. The current series of studies focus on uncertainty's role in cuing an impetus for action and difficulty's role in sustaining effort, consistent with IBM theory predictions. Furthermore, I demonstrate that interpretations of both uncertainty and difficulty are linked to the salience of academically and career-oriented future selves and can be contextually cued.

Uncertainty

Pursuing important goals can be an uncertain process both internally (about the self) and externally (about processes outside the self). Certainty about the self and one's abilities is a driving force behind much of motivation, and is the crux of self-efficacy theory (Bandura, 1977; 1997), which assumes people are motivated to pursue goals and behaviors based on beliefs that

their behaviors will result in desired outcomes. In other words, the focus is whether or not one is capable of performing a behavior that will lead to an outcome, whether or not one is efficacious (Bandura, 1977). “Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and adverse experiences” (p. 194, Bandura, 1977). Other theories of motivation have discussed the importance of certainty about the self as well. Expectancy value theories discuss one’s expectancy for success in determining whether action is taken (Atkinson 1957; 1966; Eccles et al., 1983; Feather 1982; 1992, Vroom, 1964); action-outcome expectancy (Heckhausen, 1977; 1991) discusses the probability one’s behavior can change a situation; behavioral control theory (Fiske & Taylor, 1991) discusses the ability to alter or end an aversive event; control beliefs (Skinner, Chapman, & Baltes, 1988) discuss the extent to which one can cause desired outcomes while avoiding undesired ones; and perceived control (Burger, 1992; see also Rodin, 1990) discusses the perceived potential to change events, just to name a few. Thus, certainty about the ability to produce an outcome is important for motivation.

In thinking about motivating behavior, knowing one has the capacity to succeed is certainly a good thing. But will this knowledge always cue action taking from moment to moment? Some literature suggests that it might not. While level of self-efficacy is likely positively related to the level of difficulty of a goal (if I am more capable I can choose harder goals) and persistence, the relationship with goal planning and action may sometimes be negative (Vancouver & Kendall, 2006). Someone high in self-efficacy should feel more prepared for what lies ahead (whether or not they actually are prepared), meaning that engagement in future preparation and action is less crucial. In other words, when certainty about one’s abilities is high, engagement in behaviors that can increase success may be low, which can hurt outcomes. The literature confirms this idea; college students who felt more efficacious about their ability to get

a certain grade on an exam planned to and did spend less time studying, which in turn hurt their performance and resulted in lower grades (Vancouver & Kendall, 2006). Experimentally boosting efficacy can also decrease effort and performance (Vancouver, Thompson, Tischner, & Putka, 2002).

Yet having students doubt their ability to perform behaviors does not seem to be the best way to motivate action either (see learned helplessness, Abramson, Seligman, & Teasdale, 1978). Rather than uncertainty about the self, what message does uncertainty about the world convey? In an analogous manner to uncertainty about the self, world uncertainty may on the surface seem harmful for motivation since not knowing what will happen may be frightening. This may be one way low-income contexts have detrimental effects, by implying the uncertainty of outcomes. But, I argue, uncertainty about the world need not imply the failure is imminent, only that outcomes are not guaranteed. The lack of a guarantee that desirable outcomes will occur on their own creates an impetus for action if (and only if) one feels they are the kind of person who can influence outcomes (i. e., is certain about the self). So, in the context of uncertainty about the world, certainty about the self should motivate action, since additional effort can increase the likelihood of success (though again, it is unlikely that uncertainty about the world alone or uncertainty about both the self and world would motivate). One doesn't know what obstacles lay ahead, so one should get going (i. e., take action) now rather than when it is too late. And one is capable of taking action. In fact, in the previous literature reviewed, effort may not have suffered because of feelings of certainty about the self, but because of implicit feelings about world-certainty – one can begin studying at any time if they expect the exam to test information they know. But if they don't know what will be on the exam, making sure they

study and are familiar with all the material is a better strategy for success. A dose of world-uncertainty while preserving self-certainty may serve as a push to act now.

Difficulty

Pursuing important goals can be difficult. But just as uncertainty can be motivating, the experience of difficulty does not have to be a bad thing and can be motivating as well. Classic experiments on cognitive dissonance highlight that we often prefer that which is harder to attain. In one such study, Aronson and Mills (1959) had women undergo either a severe or mild initiation for what they later learned was a very unexciting group. The women in the severe initiation condition said they enjoyed being part of the group more, justifying the effort that it took to join. If difficulty is seen as an aversive event, then working through it should result in a greater valuation of the outcome (Klein, Bhatt, & Zentall, 2005). In another study, women were assigned to a high effort or low effort weight loss program. The high effort group lost significantly more weight over time (Axsom & Cooper, 1983). Assumedly, the attractiveness of the weight loss goal was elevated by the need for high effort, making the women more committed to the goal and more likely to take action to lose weight. More recent research highlights that when pursuing a goal, effort signals instrumentality in achieving that goal. Therefore, difficulty and high effort are preferred over ease and low effort since effort makes the chances of achieving a goal more likely (see Labroo & Kim, 2009). In this way, difficulty can be seen as a sign of progress and the need to keep trying ('no pain, no gain'). As Oyserman (2013) discusses, doing something such as saving for college is not easy, but that lack of ease may imply that the goal of college is an important one (why else would one endure difficulty?). The motivational power of difficulty has limits, though. Effort priming works for easy and difficult tasks, with difficult tasks eliciting the most effort mobilization, but it does not work for

impossible tasks (Silvestrini & Gendolla, 2013). Brehm & Self (1989) propose and provide evidence for motivation increasing with difficulty to the point that difficulty becomes too great; then, effort sharply declines.

These positive effects of difficulty on motivation are all contingent on seeing the difficulty one engages in as something one should be engaging in and a sign of the importance of the goal to the self. This makes sense from an evolutionary perspective; if we see difficulty as a sign of importance, it will keep us in pursuit of goals that may be hard but are important to achieve for survival (Charnov, 1976; Nesse, 2009). Unfortunately, this may not always be the interpretation of difficulty that readily comes to mind. Just as we need a mechanism to engage, we should also have a way of quitting goals that may not be possible, conserving rather than wasting resources. The idea of disengagement in the face of difficulty is also supported by the naïve theory that difficult things are not true (Schwarz & Bless, 1992). Based on this, difficulty pursuing an identity or goal might indicate that it is not a good fit with the self.

From the evolutionary logic, difficulty can likely be interpreted as a sign of importance, leading to increased task engagement and effort, or impossibility, leading to decreased task engagement and effort. That difficulty is interpreted this way is a central prediction of IBM theory (Oyserman 2007; 2009). Moreover, whereas other theories may make predictions about the motivational impact of difficult tasks, IBM predicts effects for the interpretation of experienced difficulty itself. This approach moves beyond recognition that some tasks are easy and some are hard to a recognition that how one interprets that experience of ease or difficulty is just as meaningful in predicting motivation. This parallels the previously discussed distinction between motivational potential, which is more concerned with the “can” of motivation, and motivational arousal, which is more concerned with the production of goal-relevant behavior, i.

e., action, in the moment (Brehm & Self, 1989). How difficulty is interpreted in the moment matters for action. Interpreting experienced difficulty as importance signals the relevance of a goal for the self and the likelihood of success, increasing action, while interpreting experienced difficulty as impossibility signals the irrelevance of a goal for the self and the futility of action, increasing inaction. In order to help students maintain action, experienced difficulty must be understood as a cue of the importance of the goal and effort.

The current work

In sum, action is instrumental for success on academic goals and the attainment of desired future academic and career selves. While one's academic self should be salient in school environments, students are unlikely to engage in action when the context does not signal the need to get going now or experienced difficulty is seen as a sign of the impossibility of success. In order to start and sustain effort, contextual cues should send the message that now is the time to get going and that difficulty is not a sign to quit but to keep going. I propose this is possible through inducing feelings of certainty about the self in combination with uncertainty about the world and by having students interpret experienced difficulty as a sign of importance, emphasizing the relevance of action to achieve one's goals. In this way, students across grade levels, racial and ethnic divides, socioeconomic classes, and gender lines can take action that will increase the likelihood of success in school and in life.

The following chapters detail three sets of studies which aim to test the above predictions. Each set of studies is presented as a stand-alone paper but is unified through this introduction with the common goal of addressing student outcomes in school. The final set of studies is followed by a brief summary, but the crux of the final chapter is a discussion of

limitations, future directions, and general theorizing about the integration of this body of work with the larger literature.

Chapter II

Give up or get going? Productive uncertainty in uncertain times

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Abstract

We live in uncertain times; the path toward attaining important goals is best thought of as probabilistic, not certain. Three studies test the prediction that this ‘world uncertainty’, uncertainty about the path, is motivating if accompanied by certainty that one can have the skills needed to work on one’s goals. Self- and world-certainty were separately manipulated in college students and effect on salience of academic and career possible selves and behaviors was assessed. For students, self-uncertainty reduces salience of academic-career possible selves (Study 1) but self-certainty does not help unless combined with some world-uncertainty (Study 2). This combination also increases planned study hours (Study 2) and actual goal-focused action, working on a resume builder instead of playing games (Study 3).

Productive Uncertainty in Uncertain Times

These are uncertain times, and it seems unlikely that the world will become a more certain place any time soon. The destination is often clear – get a good job, one that is meaningful and fulfilling. Yet no path can guarantee success; even students with the highest grades and best summer internships do not necessarily land dream jobs after graduating, and those who do can't be sure that their jobs will continue to exist in the foreseeable future. Despite this uncertainty, college enrollment has not dropped (U. S. Department of Education, 2012). The uncertain economic perspective is not pleasant to imagine or struggle through but it is the reality for students and nonstudents alike. Could uncertainty, in some circumstances, be productive, motivating engagement in goal relevant action? To address this question, this paper develops a working model of *productive uncertainty* rooted in identity-based motivation theory (IBM, Oyserman, 2007, 2009). IBM theory predicts that people prefer to act in identity-congruent ways, but that what that implies is context dependent. As applied to uncertainty, IBM theory predicts that the situational constraints and affordances created by uncertainty matter in determining which identities come to mind and what a particular identity means for current action. For college student, this implies the “right” kind of uncertainty increases the accessibility of a particular subset of their identities, namely, their academic and career-focused possible identities, and increases their sense that now is the time to make plans for and to act to attain these possible identities.

As outlined next, neither considering the motivational consequences of certainty in one's self and in the world outside oneself nor considering when self-concept matters for action toward long-term goals are novel topics (for a review, see Swann & Bosson, 2009). Indeed, in focusing on when future-oriented elements of self-concept influence action, we join a large tradition in

identity, personality, and self-concept research which highlights that simply having a future identity does not mean one will act on it (e.g., Back, Schmukle, & Egloff, 2009; Bong & Skaalvik, 2003; Diefendorff, Hall, Lord, & Streat, 2000; Kuhl 1994; Hoyle, & Sherrill, 2006). What is new is our focus on the self and world as conceptually distinct sources of certainty and uncertainty that are dynamically constructed in context and have interactive effects on which aspects of identity come to mind and thus which actions make sense in the moment.

Self and world: certainty, confidence, control

To understand what this framework implies for the interplay between self- and world-certainty, it is useful to consider that people experience situations as informative both about themselves and about the world outside the self. Both self- and world-certainty and uncertainty have been used as main effects in a number of theoretical frameworks including stress and coping theory (Lazarus & Folkman, 1984) and reformulated learned helplessness theory (Abramson, Seligman, & Teasdale, 1978). For example, reformulated learned helplessness theory (Abramson et al., 1978) predicts that people quit either because they feel uncertain about their ability to produce desired behavior or uncertain that their behavior will have the desired effect. Self-efficacy (Bandura, 1977), stereotype threat (Aronson & Inzlicht, 2004), expectancy-value (e.g., Feather, 1982; Maddux, Norton, & Stoltenberg, 1986), and the theory of planned behavior (e.g. Ajzen, 2002) all include formulations of the motivational power of self-certainty vs. uncertainty in some form. Ajzen (2002) for example argues that both a sense of control or certainty about the world and about the self contribute to plans for behavior, while Aronson and Inzlicht (2004) showed that uncertainty about the self's academic ability was related to vulnerability to stereotypes. Though distinct, each formulation considers ways in which doubts about the self can be undermining, often in conjunction with uncertainty about the world. While

each of these formulations has shed light on particular ways in which self- and world-certainty can function in tandem, our focus is distinct in that we predict that self-certainty (feeling relatively certain that one has the skills and abilities to attain one's goals) is motivating in the context of world-uncertainty (feeling that the path to the future is uncertain), rather than that certainty is motivating and uncertainty is not.

World- and Self-Certainty: Operationalizations

We use the general terms world- and self-certainty rather than other related constructs such as self-efficacy and outcome expectancies to reduce confusion about what we are referring to. As detailed next, we are interested in what might be considered an aspect of self-efficacy and of outcome expectancies – certainty. Our operationalization of these constructs follows. In each of the studies in this paper, we translate our operationalization into a manipulation.

World-certainty and uncertainty. We define world-certainty as the feeling that desirable outcomes can be achieved and undesirable ones avoided *because the path connecting means and ends is clearly predictable and stable*. A clearly predictable and stable path implies that if action is taken, success will follow. Thus, world-certainty implies that one can start at any time and the outcome will be as predicted. Conversely, we define world-uncertainty as the feeling that one may or may not be able to achieve desirable outcomes or avoid undesirable ones *because the path connecting means and ends is unpredictable and probabilistic* rather than clear and stable (e.g., Skinner, 1996; Weisz & Stipek, 1982). An unpredictable and probabilistic path implies that one's external context cannot guarantee success. Thus, world-uncertainty implies that one should start sooner rather than later since initial attempts may not unfold as expected and multiple attempts may be needed.

World-uncertainty is thus distinguishable from a number of conceptually related themes including procedural or distributive justice, belonging uncertainty, and expectancy. Procedural and distributive justice focus explicitly on whether processes and distributions of rewards and punishments are clearly specified and *fair* rather than simply uncertain (e.g. Tyler, 2012; 2013; McFarlin & Sweeney, 1992; Thibaut & Walker, 1975). Belonging uncertainty (Walton & Cohen, 2007) focuses on stigmatization and social bonds rather than cause and effect in the world generally. Outcome expectancy or likelihood is “a person’s estimate that a given behavior will lead to certain outcomes” (Bandura, 1977, p. 193). Outcome expectancy predicts that when action is taken, it will either produce the desired outcome or not. World-uncertainty, on the other hand, implies that it is best to start trying because any single try may or may not result in success since the path itself is probabilistic. What is uncertain is not the end state one is trying to reach but rather the path.

Self-certainty and self-uncertainty. Consistent with others, we define self-certainty as the feeling that one can learn and follow the steps associated with achieving one’s goals, and self-uncertainty as feeling *doubtful that one can learn and follow the steps* associated with such goals (De Cremer & Sedikides, 2005; Olseon, Poehlmann, Yost, Lynch, & Arkin, 2000; Skinner, 1996). An uncertain self does not mean that failure is inevitable, but that the self is not likely to be the agent of success. In that sense, self-certainty is similar to self-efficacy, which Bandura (1977) defines as the belief that *one is capable of executing desired behaviors*. Feeling certain about one’s abilities should heighten one’s willingness to engage in effortful goal pursuit (e.g., Atkinson, 1964; Bembenutty, 2009; Feather, 1982). Likewise, feeling uncertain about one’s abilities or about being able to learn the skills to move towards one’s goals should imply that goal-focused action (e.g., studying) is futile, increasing the temptation of immediate

gratifications (e.g., partying instead of studying) and decreasing goal-directed action. Indeed, this intuition underlies expectancy value theories, which were initially developed to predict attitudes toward objects and behaviors and have since been generalized to predict behavior and behavioral intentions (e.g., Ajzen, 1988; Fishbein & Ajzen, 1975). Over time uncertainty about one's ability to achieve desired academic identities is associated with misbehavior in school and a variety of risky behaviors such as binge drinking and drug use (Honora & Rolle, 2002; Griffin, Botvin, Nichols, & Scheier, 2004; Ludwig & Pittman, 1999). Whereas efficacy expectations are often examined separate from outcome expectancies, we argue that since self-certainty operates within the context of certainty and uncertainty about the world, understanding the motivational power of one requires considering it in the context of the other.

Negative Consequences of Certainty

Studies sometimes show that certainty rather than uncertainty undermines effort and learning. For example, effort in computer games is undermined by progress feedback that enhances certainty of success (Amir & Ariely, 2008), and certainty induced by knowing that one will have additional chances reduces the likelihood of taking immediate future-focused action (Khan & Dhar, 2007). Further, both self-report and neural measures indicate increased engagement with learning material when uncertainty is present (Howard-Jones & Demetriou, 2009; see also Ozelik, Cagiltay, & Ozelik, 2013). The same is true for research examining self-efficacy. There is some evidence that heightened self-efficacy can increase various kinds of risk-taking (Llewellyn & Sanchez, 2008; Llewellyn, Sanchez, Asghar, & Jones, 2008; Merritt & Tharp, 2013; Slanger & Rudestam, 1997), undermine effort (Powers, 1991; Stone 1994; Vancouver & Kendall, 2006; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001; for rebuttals, see Bandura & Jourden, 1991; Bandura & Locke,

2003) and does not always prove to be a robust indicator of behavioral intentions by itself (see Maddux, Sherer, & Rogers, 1982; Maddux, Norton, & Stoltenberg, 1986). Thus, college students who feel more efficacious about learning spend less time studying than those who feel less efficacious, and less studying predicts worse grades (Vancouver & Kendall, 2006). Further, longitudinal analyses using national (Elliott, Chowa, & Loke, 2011) and regional (Uno, Mortimer, Kim, & Vuolo, 2010) datasets show negative effects of self-efficacy on college attendance and no effects of academic self-efficacy on college completion. Experimentally boosting efficacy decreases effort and performance (Vancouver, Thompson, Tischner, & Putka, 2002), perhaps because it implies that one is certain about both one's abilities and about world processes – a combination that creates so much certainty that effort does not feel necessary.

Productive Uncertainty

So when is uncertainty helpful and when does it undermine motivation to work toward one's possible selves? A first step is to distinguish between self- and world-certainty and their impact (for a discussion, see Skinner, 1996). In order to do so, we focus on how these constructs are interpreted, building upon identity-based motivation theory (Oyserman, 2007). Identity-based motivation theory (IBM) predicts that though people prefer to act in identity-congruent ways, the identity-to-behavior link is often opaque because which identities come to mind and what they imply for current action is a function of the affordances and constraints in the current situation. Situations matter in part by influencing whether experienced difficulty in goal pursuit is interpreted as implying that the identity is important or impossible to attain (Oyserman, Bybee, & Terry, 2006; Oyserman & Destin, 2010). Prior experiments have demonstrated that manipulating students' interpretation of difficulty as implying importance enhances the

accessibility of their school-focused identities and increases academic task engagement (Smith et al. 2014).

Interpretation of experienced uncertainty is also required. Applying the IBM model and its emphasis on the interpretation of experience to certainty and uncertainty, situations can cue a feeling of certainty or of relative uncertainty about the self as well as a feeling of certainty or of uncertainty about the world outside oneself (i. e., one may or may not have the needed skills, and the path may be stable or unstable). Experiences of self-certainty and uncertainty likely run along a continuum from complete certainty (e. g., “I have what it takes to achieve this goal”, implying the self as the agent of success) to complete uncertainty (e. g., “I don’t have what it takes to achieve this goal”, implying any source of success is outside the self). World-certainty and uncertainty likely run along a similar continuum from complete certainty (e. g., “the path to my goals is clear”, implying external factors will assure success) to complete uncertainty (e. g., “the path to my goals is unclear”, implying external factors will not assure success). For ease, these can be parsed into a positive sense of certainty (‘I have or can have what it takes’, ‘the path to get there is clear’) and a moderate level of uncertainty (‘I may not have what it takes’, ‘the path to get there is not clear’), yielding four possible states (self- and world-certainty, self- and world-uncertainty, self-certainty with world-uncertainty, and self-uncertainty with world-certainty).

Feeling certain about the world and about the self should yield a confident sense that as soon as one gets going, one will succeed. Like the hare in the parable of the tortoise and the hare, a certain self in a certain world may underperform simply because this certainty leads to a sense that one can always focus later. On the other hand, feeling uncertain about the self should not be particularly motivating either, and may be sufficient to demotivate action, no matter how certain or uncertain one is about the path. This leaves the last option, feeling certain about the self but

uncertain about the world. If the world is an uncertain place, attaining one's future identities may be difficult, but if one is confident one has or could have the requisite skills, then difficulty is likely to be interpreted as task importance (Labroo & Kim, 2009). When interpreted in the context of feeling certain that one has the skills to succeed, feeling that the world is an uncertain place should highlight the need for action and lead to increased goal salience and goal-related effort and persistence.

An uncertain world signals that success is not guaranteed, so the effort one is capable of is necessary for success. Thus, world-uncertainty when paired with self-certainty is a signal that applying additional effort can increase the likelihood of success. The domain in which one is motivated to act is likely to be linked to life situations, developmental phase, and immediate contextual cues. In our studies we focus on college students, for whom academics and future career may be more or less salient as a dominant motivational theme. Identity-based motivation theory implies that even if academics and future career are salient, whether they come to mind as possible identities and whether one takes congruent action depends on if in context that future self feels relevant to current possible action. Productive uncertainty in the context of academics and career should make relevant possible identities salient and increase likelihood of seeing and seizing possibilities for future action.

CURRENT STUDIES

We test these predictions by manipulating the source of experienced uncertainty, starting with Study 1 and the simple prediction that source of uncertainty matters, and then move on to test the combined effect of manipulating both self- and world-(un)certainty. In Studies 2 and 3 we test our productive uncertainty prediction that world-uncertainty paired with self-certainty can create a motivated state which brings academic and career-focused possible identities to

mind and spurs action to attain these identities. In Study 1 we start simply by priming uncertainty about the world or about the self. This sets the stage by demonstrating that uncertainty about the self is more undermining of academic and career-focused possible identities than uncertainty about the world, though both lead to accessibility of the construct of uncertainty. In Studies 2 and 3 we manipulate both self- and world-certainty and uncertainty. Following our opening example, we target certainty and uncertainty of college students about their prospects five years in the future.

STUDY 1

Participants were randomized to either write about self-uncertainties or to experience uncertainty that did not implicate the self metaphorically (by rolling dice), or were given no task prior to the dependent measure. Metaphors such as ‘rolling the dice’ imply that the process is due to luck or chance, not one’s own skill (for reviews of the literature see Landau, Meier, & Keefer, 2010; Meier, Schnall, Schwarz, & Bargh, 2012). The dependent measure was the number of academic and career-focused possible identities and strategies to attain them that students generated. Academic and career-focused identities are the most common responses to possible selves prompts in this age group and, when salient and combined with strategies, predict goal-focused action (for reviews, Oyserman, Elmore, & Smith, 2012; Oyserman & James, 2011; Seginer, 2009).

Sample and Method

First-year undergraduates ($n = 102$; 63 female) participated for course credit by completing a Qualtrics computerized survey study about students’ vision of their future while seated in a private cubicle. Qualtrics randomly assigned participants to one of three conditions: self-uncertainty, $n = 32$; world-uncertainty, $n = 34$; or a no uncertainty manipulation control, $n =$

36. Cell sizes are uneven due to true randomization, which was used in all three studies rather than forcing equal cell sizes. In the self-uncertainty condition, participants read the following text adapted from Hogg, Sherman, Dierselhuis, Maitner, and Moffitt (2007): *Take a few moments to think about yourself, considering what you are like now and who you may become in the future, write down three things that make you feel most uncertain about yourself.* Participants were provided three numbered lines to write their responses. In the world-uncertainty condition, we had participants roll a pair of dice three times to prime the idea of uncertainty. Dice are commonly used in board games combining chance and skill. Participants read aloud the number attained on each roll and the experimenter recorded it without comment. In the control condition participants proceeded directly to the dependent variable as described below.

Next, all participants were asked to respond to the following prompt: *Please take a moment to think about yourself five years from now. Where do you see yourself? In a short paragraph, please describe how you would like to be and how you would like not to be five years in the future. Please write some examples of the things you will be doing to meet the future goals that you were thinking of.* After this task, participants answered demographic questions.

Finally, students completed a manipulation check consisting of a form with these instructions: *Please complete the word by filling in the missing letters and write the word in the space provided. Please work quickly and do not spend too much time on any one stem. If you cannot think of a word, move on. Please return this page to the experimenter when you are finished.* There were 12 word stems, three fillers that could only be filled by neutral words and nine critical word stems that could be filled by uncertainty-related or neutral words. An example of a filler word stem is MI_ _ _ _ _ , which could be filled out as *Michigan* (students were at the University of Michigan). An example of a critical word stem is DO_ _ _ , which could be filled

with neutral words such as *donut* or *doors*, or with an uncertainty-related word, e.g., *doubt*. Word stems were piloted to insure that the uncertainty stems could be completed with either neutral or uncertainty terms.

Manipulation Check

The word completion task demonstrated that participants did not differ in how many word stems they completed ($F(2, 98) = .09, p > .9$), but rather in the number of word stems they completed with uncertainty words, $F(2, 98) = 6.80, p < .01$. Paired contrasts showed that control participants ($M = 17.8\%$, $SD = 15.4\%$) completed fewer of the critical stems with an uncertainty word than did participants in the self- ($M = 33.8\%$, $SD = 21.8\%$) and world- ($M = 28.6\%$, $SD = 17.3\%$) uncertainty conditions, $ps < .02$. Uncertainty words were just as accessible to self- and world-uncertainty participants, $p > .25$.

Preliminary analysis

Prior to detailed analysis, we examined the general content of students' responses to the possible selves prompt by using the online tool *Wordle* (Wordle.com). Excluding words that were repeats of the prompts, the most frequent words used in student responses were similar across conditions. The most common words were "school", "job", "life", "good" (self-uncertainty condition), "school", "job", "Michigan", "future" (world-uncertainty condition), and "school", "job", "Michigan", "college" (control condition), implying that across conditions students were focused on job and school (Michigan is a common shorthand form for the University of Michigan).

Next, two research assistants that were blind to condition and hypothesis used the coding scheme developed by Oyserman and Saltz (1993) to content-code responses. Inconsistencies were discussed to consensus. All participants generated at least one possible-self response. Most

commonly possible identity responses focused on academics and career (e.g., “I would like to be attending law school at a highly ranked university”, “I wouldn’t want to be a dropout”), as did strategies to work on these possible identities (e.g., “maintain a high GPA”, “doing research internships”). Academics and career responses accounted for almost 60% (56.7%) of possible identities ($M = 2.91$, $SD = 1.32$, range 0-6) and two thirds (67%) of strategies ($M = 2.51$, $SD = 1.22$, range 0-6).²

Analysis Plan

We used analysis of variance and covariance, as detailed next, to examine the effect of condition on academic and career possible identities and strategies. Because the same pattern of condition effects was found if academic and career possible identity and strategy scores were analyzed separately, for parsimony, analyses presented below used the sum score of academic and career-focused possible identities and strategies ($M = 5.42$, $SD = 1.90$). We ran analyses twice, once as an ANCOVA, controlling for the total number of possible identities and strategies generated, and once as an ANOVA without this control. The control allowed us to assess the salience of academic and career identities relative to other identities. We did not predict or find a gender difference so gender was not included in analysis.

Results and Discussion

Assignment to condition affected how many academic and career-focused possible identities and strategies students generated, both when controlling for how many possible identities and strategies they wrote, $F(2, 98) = 3.47$, $p = .035$, and without this control, $F(2, 99) = 4.03$, $p = .021$. Students in the self-uncertainty condition generated fewer academic and career-

² Other than academics and career, possible identities were, in order of frequency, focused on social-relational (14.9%), financial (13.3%), mental health (10.1%), and health and appearance (1.8%).

focused possible identities ($M = 4.81$, $SD = 1.60$) than control condition students ($M = 5.76$, $SD = 1.59$, $p = .016$, $d = .60$) and students in the world-uncertainty condition (who rolled dice, $M = 5.64$, $SD = 1.59$, $p = .037$, $d = .52$). Control and world-uncertainty responses did not differ ($p = .76$).

We followed up with supplementary analyses to look for alternative explanations such as the possibility that self-uncertainty changed the valence of possible identities, perhaps driving up the number of negative possibilities and driving down the number of positive ones. However, we did not find such a pattern. There was neither a change in the number of negative feared academic and career-focused identities ($F(2, 99) = .86$, $p = .43$) nor a change in the number of positive hoped for or expected academic and career-focused identities ($F(2, 99) = 1.97$, $p = .15$). Instead, the overall reduction in the number of academic and career-focused identities was due to declines in both feared and hoped for responses.³

Study 1 showed that while both uncertainty manipulations increased accessibility of uncertainty as a construct (as shown by the manipulation check), only self-uncertainty undermined accessibility of academic and career-focused possible identities and strategies to attain them. The effect does not seem to be due to an increase in negative or a decrease in positive possible identities in the self-uncertainty condition, but rather to an overall reduction of focus on academics and career. Thus, while any uncertainty about the self may be demotivating for the career and academic focus of students, the same does not seem to hold true for world-uncertainty. But are there circumstances where world-certainty helps to motivate (rather than just

³ Condition did not affect the quantity of possible identity responses overall ($M = 5.56$, $SD = 2.36$, range 1-11), the quantity of strategies overall ($M = 3.93$, $SD = 1.62$, range 0-9), the sum of possible identity and strategy responses overall ($M = 9.49$, $SD = 3.20$), or the valence of possible identity responses (as measured by number of expected positive, $M = 4.26$, $SD = 1.94$, range 1-10, or feared negative, $M = 1.33$, $SD = 1.38$, range 0-7, responses), $ps > .4$.

not demotivate)? In Studies 2 and 3, we turn to the interplay between world- and self-certainty, predicting that when paired with self-certainty, world-uncertainty will enhance motivation. A limitation of Study 1 was that the uncertain world (rolling dice) and the uncertain-self (writing about one's self) manipulations differed greatly in format. Additionally, uncertain-self participants thought about the self in both the manipulation and dependent measure whereas other participants did not. Therefore in Study 2 we used closely parallel texts in each manipulation that avoided these issues.

STUDY 2

Students were randomized to control or one of four experimental conditions. Accessible sense of world- and self-certainty and uncertainty were manipulated by having participants read one of four texts that integrated world- and self-certainty and uncertainty statements. The text formed the opening of the study, after which students wrote about their study plans and described their future self.

Sample and Method

First year undergraduates ($n = 247$; 123 female) completed a Qualtrics computerized experiment about students' everyday college experience for course credit while seated in a private cubicle. Qualtrics randomly assigned participants to one of five conditions:⁴ self-certainty/world-uncertainty, $n = 45$; self-certainty/world-certainty, $n = 65$; self-uncertainty/world-uncertainty, $n = 43$; self-uncertainty/world-certainty, $n = 51$; control, $n = 43$. As presented in Appendix A, certainty and uncertainty were manipulated by having participants read a passage adapted from Morrison and Johnson (2011) and Hogg and colleagues (2007). In the no-prime control condition, participants proceeded directly to the dependent variables.

⁴ Studies 2 and 3 are both 2 x 2 experimental designs with hanging controls, presented as 5-cell studies for ease of interpretation. As in Study 1, true randomization results in unbalanced cells.

Participants were asked how many hours (open-ended) they planned to spend *studying and working on academic projects over the next week (not including time spent attending class)*, embedded in filler items asking about social and recreational activities. The possible self and strategies measure used in Study 1 came next, followed by demographic questions.⁵

Planned studying responses ranged from 1 to 72 hours. A few students gave such high estimates that they may have misread the instructions and included class time in their estimates. To ensure that a few extreme responses did not misrepresent results, the eight most extreme responses were recoded as $M + 2 SD$, reducing the high end of the range to 42 hours (six hours of studying a day, seven days a week), $M = 19.73$, $SD = 9.63$. Reported analyses use these trimmed data.⁶

Preliminary Analysis

As in Study 1, we ascertained that the general content of students' responses to the possible selves prompt did not vary by condition by using the online content analysis instrument, *Wordle* (Wordle.com). Across conditions, two prominent words were "school" and "job". Other common words were similar; "career" (in the control condition), "college" or "graduate" (in all experimental conditions). A few words were prominent only in some conditions, including "working" (in the self-certainty/world-certainty and the self-uncertainty/world-uncertainty conditions) and "good" and "life" (in the self-certainty/world-uncertainty and the self-uncertainty/world-certainty conditions).

Content-coding of responses followed the procedures of Study 1. Again, academic and career-focused possible identities (e.g., "I'll be in graduate school for psychology"; "I don't want

⁵ In Studies 2 and 3 we asked students for their GPA in case current academic success influenced responses or effects of conditions. No effect of GPA was found so it is not included in analyses.

⁶ Using raw scores did not change the pattern of results. Self-reported study hours correlated ($r = .15$, $p < .05$) with academic and career-focused possible identity and strategy score.

to be a drop-out”, “I’ll be a hard worker at my job”) and strategies to work on these possible selves (e.g., “studying hard”, “seeking an internship”, “developing a good work ethic”) were the most common, at 46.1% of possible selves responses ($M = 2.70$, $SD = 1.60$, range 0-8) and 63.1% of strategies ($M = 1.98$, $SD = 1.29$, range 0-6), yielding a sum score of 9.39 ($SD = 3.63$)⁷.

Results and Discussion

Assignment to condition influenced content of future self in the predicted pattern. As can be seen in Figure 1, students assigned to the productive uncertainty (self-certainty and world-uncertainty) condition generated more academic and career-focused responses than students in other conditions, both when controlling for how many possible identities and strategies they wrote (omnibus $F(4, 238) = 3.51$, $p < .01$, mean Cohen’s $d = .52$, productive uncertainty vs. all other conditions contrast, $p = .003$), and without these controls, $F(4, 239) = 2.28$, $p = .061$.⁸ Planned contrasts revealed that students in the productive uncertainty condition differed from other conditions (vs. self-uncertainty/world-uncertainty, $d = .65$, $p = .003$; vs. self-uncertainty/world-certainty, $d = .51$, $p = .014$; vs. control, $d = .65$, $p = .003$; the contrast with self-certainty/world-certainty was not significant, $d = .28$, $p = .16$).⁹

We followed up with supplementary analysis to explore alternative explanations of our results. As in Study 1, we examined whether condition influenced valence of academic and career-focused possible identities, as indicated by the number of expected and feared possible identities generated, respectively. We found an effect for positive (expected, $F(4, 239) = 2.65$, p

⁷ Other than academics and career, other possible identities were, in order of frequency, social-relational (26.9%), financial (5.0%), health and appearance (3.6%), and mental health (3.2%).

⁸ As in Study 1, the same pattern of condition effects is found if possible self and strategy scores are analyzed separately.

⁹ However, participants in the self-certainty/world-certainty condition did not differ from self-uncertainty/world-certainty condition participants ($p > .2$). They reported more academic and career-focused responses than participants in the self-uncertainty/world-uncertainty ($d = .39$, $p = .058$) and control ($d = .27$, $p = .060$) conditions did. No other contrasts were significant ($ps > .5$).

= .034) but not for negative (feared, $F(4, 239) = 1.11, p = .35$) academic and career responses. Contrast analysis showed that participants in the productive uncertainty condition generated more positive academic and career-focused identities ($M = 2.23, SD = 1.23$) than participants in the other conditions (self-certainty/world-certainty, $M = 1.75, SD = 1.14$; self-uncertainty/world-uncertainty, $M = 1.58, SD = 1.12$; self-uncertainty/world-certainty, $M = 1.73, SD = 1.11$; control, $M = 1.51, SD = 1.08, ps < .035$).

Condition also affected planned study hours. As seen in Figure 2, in the productive uncertainty (self-certainty/world-uncertainty) condition, students planned to study more hours than in the other conditions, omnibus $F(4, 242) = 2.98, p = .02$, mean Cohen's $d = .48$, productive uncertainty vs. all other conditions contrast, $p = .003$. Planned contrasts revealed that students in the productive uncertainty condition planned to study more than those in other conditions (vs. self-certainty/world-certainty, $d = .45, p = .02$; vs. self-uncertainty/world-certainty, $d = 0.50, p = .013$; vs. control, $d = 0.68, p = .001$; the contrast with self-uncertainty/world-uncertainty was not significant, $d = 0.28, p = .155$).

Taken together, the results of Study 1 suggest that uncertainty about the world alone does not undermine focus on academic and career goals, and the results of Study 2 suggest that the combination of uncertainty about the world and certainty about the self can focus students' attention on their academic and career goals. In Study 2 we found a positive effect of productive uncertainty (certainty about oneself combined with uncertainty about the world) on salience of academic and career-oriented possible identities and strategies and on planned study hours. The effect on possible identities was due to an increase in the number of expected, rather than the number of feared academic and career-focused possible identities.

While replicating the general findings from Study 1 on salience of academic and career possible identities, nonetheless, Study 2 has some limitations, which we address in Study 3. First, in Study 3 we use a behavioral measure rather than a planned behavior. Second, we use a different text as our prime to rule out the possibility that results are idiosyncratically related to a particular prime. In addition, Study 3 also helps address another limitation, which is that across our dependent measures, the predicted omnibus effect is significant and each paired contrast in the predicted direction, but for each dependent variable, one paired contrast is not significant. Which of the planned contrasts is non-significant differs by dependent measure, implying that the lack of significance is due to error variance rather than a systematic similarity of one of the other conditions to the productive uncertainty condition.

To address these potential limitations, in Study 3 we focus on real-time rather than self-reported measures and further simplified our manipulation, such that source of un/certainty is more directly linked to either self or world. We modified our control condition so that all participants engaged in a task of some sort to provide a more stringent test of our hypotheses.

STUDY 3

Participants responded to a written prompt and then were given a choice between two options, playing an online game of their choice or working on their resume while they waited for the next phase of the study to begin. As in Study 2 the text was the manipulation. We predicted that participants induced to feel relatively certain about themselves but uncertain about the world would feel a need to ‘get going’ on their future self and take the opportunity to work on their resume while other participants would not.

Sample and Method

Undergraduates ($n = 84$; 53 female, 1 missing gender information) completed for course credit what they were told was a two-part Qualtrics experiment, with the first part focused on autobiographical memory and the second part ostensibly about cognition on different types of tasks. Participants were seated in private cubicles and Qualtrics randomly assigned participants to condition (self-certainty/world-uncertainty, $n = 17$; self-certainty/world-certainty, $n = 18$; self-uncertainty/world-uncertainty, $n = 21$; self-uncertainty/world-certainty, $n = 16$; control, $n = 12$)¹⁰. Unbeknownst to them the autobiographical memory task was the manipulation.

Participants read a condition-specific passage (Appendix A) and were asked to *take a moment to think of an experience that you've had that fits with the description in the passage and briefly describe the experience and how it made you feel*. Participants were then given a choice between two options (see below) for the remaining 20 minutes of the study. They were then excused (none were asked to go on to the cognition task).

Option 1: Complete an award-winning online tutorial to help you craft an irresistible resume.

Research has shown that people who use this program to construct their resumes are more likely to get job and internship offers as well as succeed in applications to graduate schools.

Option 2: Play an online game of your choice from a large selection of top-ranked games. You can choose from our library of the newest, most popular, and most entertaining online games.

Results and Discussion

Data were fitted to a binomial logit model using generalized linear modeling. As predicted, productive uncertainty mattered for future-focused behavior. Most (82%) of students in the self-certainty/world-uncertainty condition chose the resume builder activity while less than half of students in the other experimental (48%) or control (17%) conditions did so, omnibus χ^2

¹⁰ Readers may again notice that the cell sizes are not even. As in Studies 1 and 2 this pattern is due to the randomization procedure and not due to loss of participants.

(4, $N = 84$) = 22.74, $p < .001$, productive uncertainty vs. all other conditions contrast, $p = .003$.

This pattern is replicated in planned contrasts (see Figure 3): productive uncertainty vs. self-certainty/world-certainty, $p = .011$; vs. self-uncertainty/world-uncertainty, $p = .005$; vs. self-uncertainty/world-certainty, $p = .092$; vs. control, $p < .001$.¹¹

To rule out possible alternative explanations that the effect was due to higher positivity or to more certainty, we coded the responses students gave to the manipulation for response valence (1 = negative, 2 = neutral, 3 = positive) and whether the response conveyed certainty or uncertainty. Assignment to a self-certainty condition predicted both more positivity and more certainty (as detailed in the footnote), but neither valence (χ^2 (2, $N = 84$) = 1.60, $p = .45$) nor certainty (χ^2 (1, $N = 72$) = .003, $p = .96$) predicted behavior¹². We interpret these results as further support of our IBM-based prediction that uncertainty about the path combined with certainty about oneself is productive because of what it implies about the need to engage in effortful action.

GENERAL DISCUSSION

We opened with the observation that while uncertainty can undermine motivation, this is not always the case; people do not necessarily give up on important academic and career goals when the world feels like an uncertain place. We hypothesized that the “right” kind of

¹¹ Control students played more (control condition vs. all other conditions contrast, $p = .013$; vs. certain-self/certain-world; $p = .081$; vs. uncertain-self/uncertain-world, $p = .086$; vs. uncertain-self/certain-world, $p = .016$).

¹² Valence score was higher (more positive) in control ($M = 2.71$, $SD = .47$) and self-certainty (certain-self, certain-world $M = 2.44$, $SD = .51$, certain-self, uncertain-world $M = 2.41$, $SD = .62$) condition texts than in self-uncertainty (uncertain-self, certain-world $M = 1.63$, $SD = .72$, uncertain-self, uncertain world $M = 1.67$, $SD = .66$) texts. Certainty was more likely to be expressed in the self-certainty (certain-self and certain-world condition = 83.3%, certain-self and uncertain-world = 76.5%) conditions than in the self-uncertainty (uncertain self and uncertain world = 19.0%, uncertain-self and certain-world=12.5%) conditions. Control condition participants all wrote about breakfast, which did not lend itself to certainty coding.

uncertainty would increase salience of academic and career selves as well as planning and action toward these selves. Using identity-based motivation theory (Oyserman, 2007) as our framework, we called the “right” kind of uncertainty *productive uncertainty*, a combination of self-certainty (feeling relatively certain that one has the skills and abilities to attain one’s goals) and world-uncertainty (feeling that the path to the future is uncertain). We first distinguished effects of self- and world-uncertainty, showing that self-uncertainty blocks the accessibility of academic and career possible selves and strategies to attain them, while world-uncertainty does not. Next, we showed that the combination of self-certainty and world-uncertainty mattered. This combination increased salience of academic and career selves and strategies (Study 2), increased planned study hours (Study 2), and motivated real behavior (using a resume builder rather than playing online games, Study 3) in pursuit of those possible selves. Effects for other conditions were not consistent across dependent variables, implying that these conditions might sometimes matter and that other moderators of their effectiveness may exist.

Just as contexts modulate automatic evaluations generally (Gawronski & Cesario, 2013), world-certainty and uncertainty modulate the consequences of self-certainty. Productive uncertainty highlights that people simultaneously experience certainty about themselves and uncertainty about the path. This mix signals that obstacles are due to world hurdles rather than personal interest or skill, and therefore, one ought to start working on one’s important self-goals immediately rather than later, as world processes may interfere and success is not guaranteed (despite one’s capabilities). Other combinations of certainty and uncertainty do not highlight this impetus for action but instead demotivate through a lack of ability (self-uncertainty), a sense of complacency since world outcomes are guaranteed (world-certainty), or some combination.

In follow-up secondary analyses, we looked for evidence that our results might be alternatively explained by positive valence or by the presence of certainty in responses. This was not the case. While self-certainty sometimes increased positivity and certainty, adding positivity or certainty did not change the pattern of results. We looked separately at the possibility that productive uncertainty differentially affects salience of feared or of desired possible selves. We found no effect on feared possible selves, and differing effects on desired possible selves, implying that this may be a focus for future research. One might surmise that an uncertain world might induce flexibility in future planning and possible selves, since one doesn't know what will happen, leading to more diverse planning and future selves. Yet this alternative hypothesis does not fit with our results; Wordle analysis showed participants to have similar topics on their mind, but participants in the productive uncertainty condition still thought more of their academic and career focused selves, rather than of any possible self.

Our work complements a large body of research on long-term goals. Literature on the self and motivation has grappled with when people take action to attain their goals and what the obstacles in doing so are (Carver & Scheier, 1990; 1998). A number of possibilities have been tested. Sometimes one's will has been depleted (Baumeister, Vohs, & Tice, 2007; Hagger, Wood, Stiff, & Chatzisarantis, 2010). In other instances, one fails to notice that now is the time to act or gets stuck thinking 'when' rather than 'how' one will act (Gollwitzer & Oettingen, 2013; Oettingen & Gollwitzer, 2009), or one lacks the attentional focus (Kaplan & Berman, 2010). Alternatively, motivation may increase due to mental contrasting, bringing to mind a desired future and mentally contrasting it with the present situation. This contrasting can promote goal pursuit if expectations of success are high; otherwise, this contrasting actually undermines action (Gollwitzer & Sheeran, 2006; Kappes, Singmann, & Oettingen, 2012; Oettingen, 2000).

Other theories highlight dispositional factors in determining self-regulation; those with high self-regulatory capacity are action-oriented and have a higher likelihood of transforming intentions into behavior even in demanding situations, while those with low self-regulatory capacity are state oriented, and tend to fixate on static motivational states and negative emotions (Diefendorff, Hall, Lord, & Streat, 2000; Kuhl, 1984; 1994). And sometimes making progress itself facilitates switching to another goal (Carver & Scheier, 1990; 1998; Fishbach & Dar, 2005; Fishbach, Dar, & Zhang, 2006).

Our studies add another possibility, which is that sometimes contexts do not provide the action impetus of productive uncertainty, the motivating power of feeling relatively certain about the skills one has, but realizing that the world processes may not be in one's favor, so it's necessary to get going now. Productive uncertainty addresses familiar situations – waiting too long to pull up one's grades or waiting too long to revise a paper – not because one does not want to, but because of certainty that the path is clear so that as soon as one starts one will be able to succeed. Lack of certainty about the path provides impetus for action, therefore action is dependent on the phenomenological experience of certainty and uncertainty about the self and the world.

Across three experiments, we demonstrated that experienced (un)certainty about the self and the world can influence how the future self is conceptualized, intentions to act, and immediate action. A dose of world-uncertainty while preserving self-certainty may serve as a push to act now, since one has the needed abilities, but can't predict what roadblocks might delay or derail efforts. While we focused on academics, results may also apply to other domains such as pursuit of health goals following an unfavorable prognosis or resilience in the face of trauma. Supporting people to acknowledge both their own capabilities and the uncertain nature of the

world may be beneficial for inspiring continued goal-pursuit in a variety of domains (for conceptualizations related to trauma, see Aspinwall & Tedeschi, 2010; James, 2012; James, Noel, Favorite, & Jean, 2012). Uncertainty may be most motivating across domains when it makes one think of important self-goals and leads to planning and action, making goal attainment more likely.

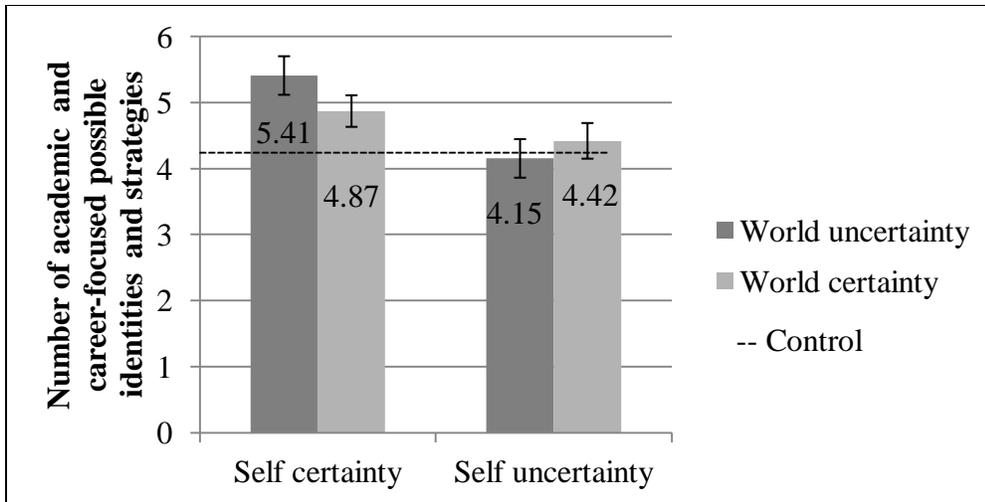


Figure 1. Study 2. Mean number of academic and career-focused possible selves and strategies by condition (with standard error bars).

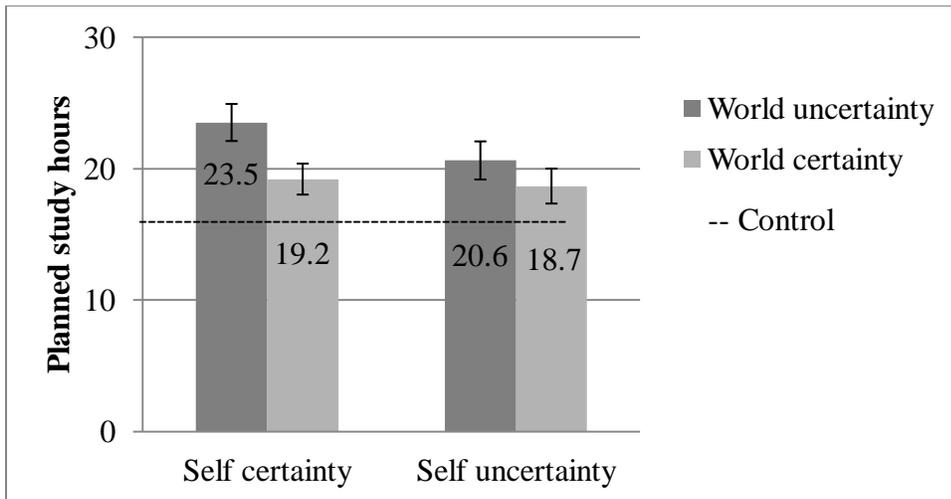


Figure 2. Study 2. Mean time allotted for academics during the next week by condition (with standard error bars).

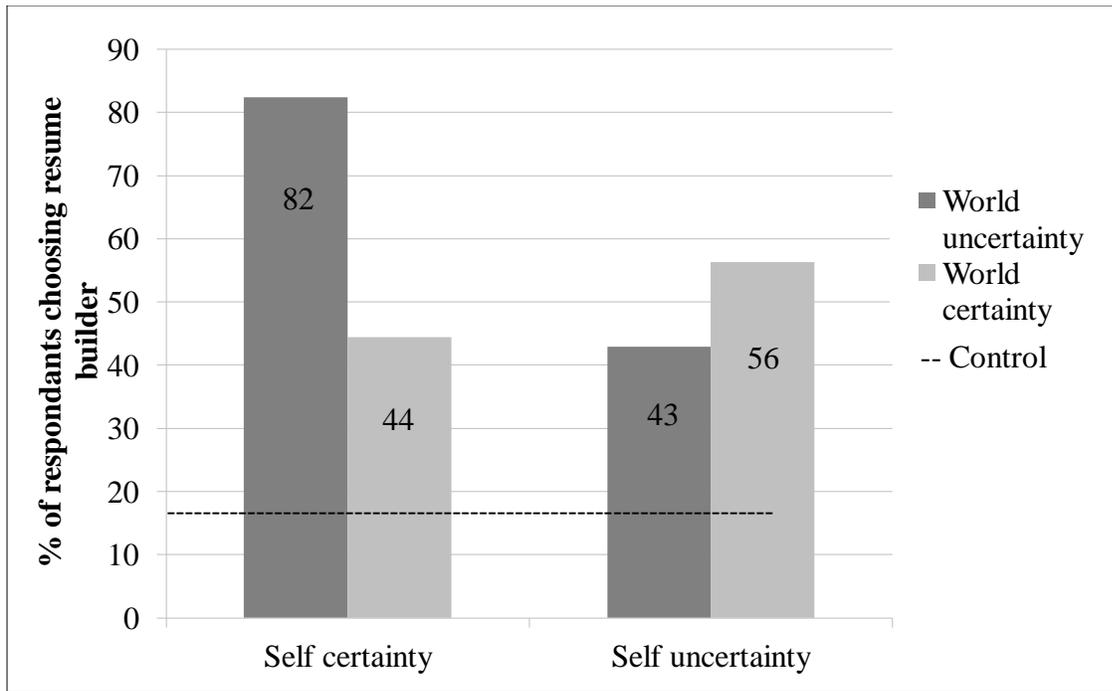


Figure 3. Study 3. Percentage of participants choosing resume builder option by condition.

Chapter III

From difficulty to possibility: How interpretation of experienced difficulty matters

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Abstract

Pursuing goals entails experiencing difficulty. Experienced difficulty can facilitate or block accessibility of task-relevant identities and engagement, depending on how it is interpreted in context. In school, experienced difficulty may be interpreted as implying that school success is identity-congruent, possible to attain, and worth the effort or that it is identity-incongruent, impossible, and not worth the effort. Indeed, children provided an interpretation of difficulty as signaling task importance generated more school-focused future identities and strategies to attain them (Study 1) and performed better on standardized intelligence and writing tasks (Studies 2c, 3). Children provided no interpretation of difficulty or an interpretation of difficulty as signaling impossibility of task success did not differ from each other (Studies 2c, 3). Moreover, interpretation of difficulty is distinct from thinking ability is fixed or changeable (Studies 2a-2b) and accessible interpretation of difficulty, not general belief about what difficulty means, influences behavior (Study 2c).

From difficulty to possibility: Implications of experienced difficulty

Difficulties are obstacles that can sometimes hinder achievement of a goal and require effort to overcome. Since for many achieving their goals can at times be difficult, experiencing difficulty is likely to be a ubiquitous concomitant of goal striving. But what does this experience imply? Does it signal that goal achievement is important and one should invest extra effort to attain one's goal? Or does it signal that goal achievement is impossible and one should redirect effort toward other possible identities? Either interpretation is plausible. Indeed, being sensitive to both possibilities is rooted in an evolutionary press for survival (Charnov, 1976; Nesse, 2009). Consider an organism foraging for food. On the one hand, sustaining and even increasing effort in the face of difficulty reduces the chance that an organism will give up too soon and prematurely move on to another area (Nesse, 2009). Hence, difficulty could imply goal importance and the need for sustained effort. At the same time, a mechanism for turning attention away from an unattainable goal is also necessary so that the organism does not starve due to inability to redirect attention toward more fruitful targets (Charnov, 1976). Hence, difficulty could also imply goal impossibility.

Moving to a broader social science perspective, there is ample evidence that as difficulty increases, so does motivation, effort, and the perceived attractiveness (i.e., importance) of the goal (for a review, Brehm & Self, 1989). Across studies, effort is low if the task is easy, and effort increases with anticipated or experienced difficulty (Brehm & Self, 1989; Silvestrini & Gendolla, 2013). Moreover, the motivating effect of difficulty disappears for impossible tasks (Brehm & Self, 1989; Silvestrini & Gendolla, 2013). Effects in these studies were found by manipulating difficulty (tasks really were possible or impossible to do) rather than by manipulating people's interpretation of what their experienced difficulty signals. Still, they are

illuminating because they imply that people are sensitive to their experiences of difficulty and use experienced difficulty to estimate whether success is possible and thus effort justified (Brehm & Self, 1989; Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991; Silvestrini & Gendolla, 2013). In the current studies we move beyond this prior work to ask if interpretation of experienced difficulty rather than difficulty itself influences which possible identities come to mind and the extent of engagement in identity-relevant tasks. To do so, we focus in particular on academic identities and engagement on academic tasks. If interpretation of experienced difficulty rather than difficulty itself matters, then it should be possible to see an increase or a decrease in the salience of school-focused future-identities and task engagement in response to experienced difficulty, depending on what difficulty is interpreted as meaning for the self.

In focusing on the consequences of interpretation of experienced difficulty for self and behavior, we build on the distinction between motivational potential and motivational arousal made by Brehm and Self (1989). Motivational potential is a relatively stable assessment of how much effort one is willing to exert on a task. It is a function of how much an outcome is valued and how competent one expects to be in carrying out relevant tasks. Motivational arousal is a measure of current effort and is assumed to be context-dependent. Expectancy-value theories focus on motivational potential, which is predicted to increase as a multiplicative function of the value of an outcome and the probability that properly executed behavior will produce the desired outcome (e.g. Eccles, et al., 1983; Feather, 1982). Because task difficulty might influence expectancy of attaining an outcome, difficulty is relevant to motivational potential (Atkinson, 1957, 1966; Eccles, et al., 1983; Feather, 1982). Thus, within expectancy-value models,

difficulty is assumed to be a stable feature of the task (Feather, 1959, 1992) and therefore likely to influence aspirations (Feather, 1959; 1992; Lewin, Dembo, Festinger, & Sears, 1944).

That low expectancy of success necessarily undermines motivation is a matter of contention (Shah & Higgins, 1997). Rather than focus on expectancies at all, in the current studies, we focus on contextual cues that frame how experienced difficulty is interpreted. In doing so, we built on identity-based motivation theory which predicts that experienced difficulty can be motivating or demotivating depending on how it is interpreted rather than on difficulty as a stable demotivating feature of the task (Oyserman, 2007, 2009a; in press). Given that multiple interpretations of experienced difficulty are theoretically possible and evolutionarily necessary, we are particularly interested in how contextually-cued interpretations of experienced difficulty matter, affecting both the salience of relevant possible identities and the performance of relevant tasks. Following the distinction between motivational potential and motivational arousal, we predict that the effect of interpretation of experienced difficulty on identity and performance is context-dependent. That is, general beliefs about whether experienced difficulty should be interpreted as a signal of task importance or of task impossibility will not have the powerful affect that contextually-cued interpretations will have.

How Experience is Interpreted Influences Performance

In thinking about the dynamic influence of experienced difficulty on identity and behavior, we build on fluency models (for a review, Greifeneder, Bless, & Pham, 2011). The idea that interpretation of experience rather than the experience itself matters has been tested first in research focusing on interpretation of positive and negative mood and then in research focusing on interpretation of ease and difficulty. Early research demonstrated that the same feeling could increase or decrease task persistence depending on which question the feeling was

assumed to address (Martin, Ward, Achee, & Wyer, 1993). Positive mood increased task persistence if the question the feeling was assumed to address was "Are you enjoying yourself?" In contrast, positive mood decreased persistence if the question the feeling was assumed to address was "Have you done enough?" What a positive mood implies differs depending on the accessible interpretation. If considering whether one is enjoying oneself, a positive mood implies that the task is the source of the positive affect (so one should keep going). In contrast, if considering whether one has done enough, a positive mood implies that having completed the task is the source of positive affect (so one should stop, having done enough already; see also Martin & Clore, 2001).

Beyond interpretation of mood effects, a large body of work demonstrates effects of experienced ease and difficulty. In order to clarify that the process involved is about ease and difficulty, researchers typically separate the source of difficulty from the judgment using it. For example, materials are presented in a difficult-to-read print font and experienced difficulty is carried over to other unrelated judgment tasks. Effects are found for outcomes as diverse as rated beauty and willingness to pay (e.g., Reber, Schwarz, & Winkielman, 2004; Song & Schwarz, 2008). Just as in the mood effect studies, the nature of the effect depends on the question participants were asked – if the question was "Is this pretty?", products presented in easy to process formats were rated as more beautiful, but if the question was "Is this complicated to make?", products presented in easy to process formats were assumed to require less skill.

Effects are also found for academic outcomes. For example, children tend to study too little if the material seems easy to learn (e.g., Spanish words that looked like familiar English words were studied too little to actually learn them, Koriat, 2008). High achieving high school students in advanced placement classes studied more when study materials were provided in a

difficult-to-read format (e.g., the Xeroxed copy was blurry or the overheads were in a difficult to read font, Diemand-Yauman, Oppenheimer, & Vaughan, 2011). Presumably these effects were found because in both cases participants misinterpreted their experienced ease and difficulty. That is, children seem to have misinterpreted the ease of recognizing the words as implying ease of remembering the words. High achieving students seem to have misinterpreted their experienced difficulty in reading the study information as implying that they were having difficulty learning and needed to work more. However, these process assumptions were not tested directly by manipulating which interpretation of experienced difficulty came to mind at the moment of judgment.

Sources of Experience Used to Interpret Difficulty Vary

From an evolutionary perspective, people should be sensitive to their experience of difficulty and use accessible information to interpret whether their difficulty is a signal of impossibility or importance of task pursuit because this interpretation will have action implications. It makes evolutionary sense to turn attention away from difficult goals if difficulty is interpreted as impossibility and to turn attention toward difficult goals if difficulty is interpreted as importance. This implies that people should have both working models of what difficulty means stored in memory as tacit or explicit lay theories ready to be made accessible depending on contextual cues. Because lay theories are part of associative memory stores, they should influence judgment and performance whether or not they are consciously and systematically brought to mind or explicitly endorsed.

Physiological arousal

Indeed, a number of studies demonstrate that people are sensitive to the interpretive implications of their bodily experiences (physiological arousal). In some studies, people "geared

up" for engagement in difficult tasks, their heart rate and systolic blood pressure increased, and these physiological changes were associated with better performance (for reviews Brehm & Self, 1989; Wright & Brehm, 1989). As would be expected if both interpretations of experienced difficulty are readily accessible, physiological changes associated with difficulty can also undermine performance, as shown by Jamieson, Nock, and Mendes (2012). These authors demonstrated that physiological arousal only improves performance if experienced arousal is interpreted as implying that the situation was challenging (compared to a no interpretation of arousal control group; see also Jamieson, Nock, & Mendes, 2013). Providing an interpretation of arousal as challenge had lasting positive effects on GRE (Graduate Record Exam) performance (Jamieson, Mendes, Blackstock, & Schmader, 2010).

Though not directly tested, Jamieson and Mendes' studies imply that physiological arousal (increased heartbeat, "butterflies" in the stomach, or sweaty palms) may be interpreted as a signal of impossibility, undermining performance. If arousal signals impossibility, then turning one's attention elsewhere makes sense (see also Roese & Olson, 2007). Together these studies suggest that physiological arousal can signal either that the task is important or impossible, depending on which interpretation of experienced difficulty is accessible at the moment of judgment.

Stereotypes

Stereotypes are an example of culturally accessible interpretations of experienced difficulty in particular situations, so accessible that they are sometimes described as "in the air" (Steele, 1997; Steele & Aronson, 1995). Accessible negative stereotypes dampen performance (for a review, Schmader, 2010) just as accessible positive stereotypes boost performance (for a review, Walton & Cohen, 2003). How does this happen? Effects on working memory (Schmader

& Johns, 2003; Osborne, 2006), self-regulation (Inzlicht, McKay, & Aronson, 2006), effort (Stone, 2002), physiological arousal (Blascovich, Spencer, Quinn, & Steele, 2001; Croizet, Dépres, Gauzins, Huguet, Leyens, & Méot, 2004; Osborne 2006; 2007), effort and attention (Beilock, Jellison, Rydell, McConnell, & Carr, 2006), negative cognitions (Cadinu, Maass, Rosabianca, & Kiesner, 2005), and belief in ability as fixed (Aronson, Fried, & Good, 2002; Good, Aronson, & Inzlicht, 2003) have all been implicated. Considered from an interpretation of experienced difficulty perspective, stereotypes cue a particular interpretation of experienced difficulty. By implying that people like oneself excel in a particular domain, positive stereotypes make an interpretation of experienced difficulty as signaling task importance accessible, facilitating task relevant identities and performance. By implying that people like oneself perform poorly in a particular domain, negative stereotypes make another interpretation of experienced difficulty as signaling task impossibility accessible, undermining identities and performance.

That interpretation of difficulty is a possible mechanism underlying stereotype threat and boost effects is supported by evidence from studies that show that effects are moderated by identity content and disappear for participants instructed about the theory. If identity includes a positive valuation and expectation of performance in the stereotyped domain, then making the identity salient should remind participants that task difficulty signals task importance and should not undermine performance. This is what Oyserman, Kimmelmeier, Fryberg, Brosh, and Hart-Johnson (2003) demonstrated (see also Armenta, 2010; Oyserman, Gant, & Ager, 1995). If stereotype threat effects work by implying that task difficulty signals task impossibility, then telling participants that others may stereotype them and think they cannot succeed on a difficult

task in the stereotyped domain should undermine the power of the stereotype. That is what Aronson and Dee (2012) demonstrated.

Experienced Difficulty and Identity-Based Motivation

Identity-based motivation (IBM) theory predicts that people prefer to act and make meaning of the world in identity-congruent ways, but that which identities come to mind and what these identities imply for action is dynamically constructed in context (Oyserman, 2009a, 2009b). Identities provide a framework for the goals one should pursue and the action one should take by allowing comparisons between the current self and salient identities, motivating action to be like the type of person one expects to be like (see cybernetic models of self-regulation, Carver, 2004). Moreover, identities are situated because thinking is for doing – action must fit situational affordances and constraints (e.g., James, 1890). In the case of school, school contexts signal how experienced difficulty in school should be interpreted by making one or another working theory (difficulty signals importance, difficulty signals impossibility) accessible. Which working theory is accessible has consequences for which identities come to mind (e.g., school-focused or not) and for what students do (e.g., how much effort they put into activities relevant to attaining school-identities, such as solving math problems or writing essays). Like other situated cognition theories, IBM assumes that identity content is dynamically constructed from information available at the moment, that contextual cues activate an associative network that makes up a momentary online self-representation (for situated models, Gawronski & Bodenhausen, 2006; Schwarz, 2007; Smith & Collins, 2009; Smith & Semin, 2004). This implies that how one thinks about oneself is influenced by what makes sense in the moment (Markus & Kunda, 1986; Oyserman, Elmore, & Smith, 2012).

Two randomized field trials of an intervention to boost school attainment by making difficulty feel normative for important goals like succeeding at school provide suggestive evidence that interpretation of difficulty can be manipulated separately from particular school tasks (Oyserman, Terry, & Bybee, 2002; Oyserman, Bybee, & Terry, 2006). The first trial demonstrated the predicted increase in school-focused future identities, concern about doing well in school, and better in-school behavior (Oyserman et al., 2002). The second trial showed that these effects were robust to two-year follow-up and that change in school-focused identities mediated change in in-school behavior, school report cards, and standardized test scores (Oyserman et al., 2006). However, because they involved intervention, interpretation of experienced difficulty as importance and salience of school-focused identities were simultaneously manipulated in these studies. In the current studies we isolate the effect of interpretation of difficulty on a school task for consequent salience of school-focused identities and task engagement.

Context and Accessible Interpretation of Difficulty

The situation of minority children growing up in low-income contexts serves as an important test of our predictions that interpretation of difficulty can be manipulated and influences identity and behavior. Low-income and minority children value education and expect to be college-bound (for reviews, Destin & Oyserman, 2010; Oyserman, Johnson, & James, 2011; Oyserman & Fryberg, 2006) but are at risk for school failure (Orfield, 2006; Orfield, Losen, Wald, & Swanson, 2004; Schneider & Stevenson, 1999). This is surprising since expectancy-value theories would predict that if a child is not doing well in school, it is either because school is not valued or because success is not expected. While it is always possible to increase value and expectation of success, our identity-based motivation framework provides an

alternative process model to understand this aspiration-attainment gap by making several predictions. First, low income and minority children will see school success as a possible identity and work hard on difficult tasks if difficulty is experienced as signaling importance, but not otherwise. Second, judgment and behavior will be influenced by which interpretation of experienced difficulty is accessible in the moment rather than by the general belief that experienced difficulty should be interpreted as importance or as impossibility. Third, low-income and minority students' chronic interpretation of difficulty will likely more closely resemble an impossibility rather than importance interpretation because of their disadvantaged circumstances and frequent exposure to others whose educational and occupational outcomes are low (Adelman & Gocker, 2007; Krivo, Peterson, Rizzo, & Reynolds, 1998).

CURRENT STUDIES

Thus, prior research has demonstrated that performance can be changed by manipulating a number of factors, including whether the task materials are easy or difficult to process, whether an interpretation of physiological response is provided, and whether an explanation of stereotype threat is provided. Integrating these strands of evidence strongly implies, but does not directly test, our prediction that interpretation of experienced difficulty is a core process underlying a variety of processes which influence identity content and engagement in goal-focused behavior.

To test these predictions we conducted four experiments and a correlational study. In our studies, we see experienced difficulty as effortful engagement in a task or behavior (see difficulty in metacognitive experiences, Schwarz, 2004). We examine children's school-focused identities (Study 1) and their performance on tasks instrumental to attaining these identities (Studies 1, 2c, 3). We predict that school-focused identities and task performance can be bolstered or undermined depending on what experienced difficulty in school is understood to

signal in the moment. Specifically, we hypothesize that situations which frame difficulty as importance should increase the accessibility of academically-focused possible identities (Study 1) and improve academic performance on demanding academic tasks (Studies 1, 2c, 3) compared to situations which frame difficulty as impossibility or provide no interpretation of difficulty. Moreover, we do not expect differences in performance between framings of difficulty as impossibility and no interpretation conditions. Because our constructs are new, in a correlational study (2a) and an experiment (2b) we also provide an initial test of the distinction between interpretation of difficulty and a related construct, belief in the fixed or malleable nature of ability (Dweck, 2006).

Study 1

Sample

Participants ($N = 78$, $M_{age} = 11.01$, $SD = 1.32$, 54% boys) were enrolled in a remedial after-school program for 4th to 8th graders in a Detroit-area school that served low-income (96% free or reduced lunch) Yemini children (64% born in Yemen, 36% born in the U.S. to Yemini parents).

Procedure

Parental consent was obtained in English or Arabic. The sample included early readers so a member of the research team sat individually with each child in a quiet space, reading aloud the manipulation, dependent measures, and demographic questions in the order presented below. The one-to-one procedure minimized concerns about reading ability but meant that data collection took several days. To minimize disruption to the after-school program, the procedure was short (no more than 15 minutes). There were two conditions and questionnaires were randomized prior

to data collection each day. Children were assigned to the questionnaire at the top of the stack. Daily re-randomization and absences resulted in somewhat uneven cell sizes.

Condition manipulation. Children in both the experimental and control groups were reminded of difficulty, but only the experimental group was provided importance as an interpretation of this difficulty. In the experimental condition ($n = 38$), children heard, *doing well in school can be really difficult and some people say that (After-School Program Name) is for children who believe they need to do extra work because school is important to them. When was a time that you kept working even though school was really difficult?* The control condition ($n = 40$) children heard an almost identical text: *doing well in school can be really difficult and some people say that (After-School Program Name) is for children who believe they need to do extra work. When was a time that school was really difficult?*

Identity and performance measures. Next children heard *each of us has an image or picture of what we want to be like and what we want to avoid being like in the future. Think about next year; imagine what you'll be doing next year. What would you expect to be like next year and what are you doing now to be that way?* After children responded, they were asked to *think a minute about ways you would not want to be like next year, things you are concerned about or want to avoid being like. What would you want to avoid being like next year and what are you doing now to avoid being that way?* Instructions and materials were taken from Oyserman, Bybee, and Terry (2006).

Finally children were shown a penny, nickel, dime, and quarter glued to a page and instructed to *please come up with as many ways as you can to make 63 cents, using any kind of coins in any amount you want.* Children were left to work on the task alone and were told to tell the experimenter when they were finished. We recorded time spent on the math task with a stop

watch, but time did not differ by condition ($p = .819$). Instruction set and materials were adapted for a younger age group from Oyserman, Gant, and Ager (1995). All but four children understood instructions and were able to carry out the task; only one child figured out that number of possible solutions is limitless and had to be stopped at 4 *SD* above the mean.

Control variables. When children were finished, the interviewer recorded participant gender and asked participants to report their age and generational status in the U.S. (i.e., *where were you born, where was your mother born, where was your father born*).

Manipulation check. The experimental and control condition differed only in that experimental condition children were asked to give an example of a time they worked hard in spite of difficulty, while control condition children were asked only to give an example of experienced difficulty. To verify that children were sensitive to the manipulation, we coded the content of their open-ended response. Indeed, children were sensitive to the manipulation. Children in the experimental condition were over three and half times more likely to give an example of a time that they had worked hard in spite of difficulty than children in the control condition (44.7% vs. 12.5% respectively, $\chi^2(1,78) = 10.00, p = .002$). In contrast, children in the control condition were 60% more likely to give an example of a time they had difficulty without mention of continued effort than children in the experimental condition (82.5% vs. 50% respectively, $\chi^2(1,78) = 9.26, p = .004$). A small number of children ($n = 4$, 2 in experimental and 2 in control) did not give an example of a time they had difficulty at all and are excluded from the remainder of analyses.

Preliminary analyses. Possible selves and strategies were tallied. Children averaged about two responses in each category (expected identities $M = 2.49, SD = 1.09$, feared identities $M = 2.30, SD = .95$, strategies for attaining expected identities $M = 2.24, SD = 1.06$, strategies for

avoiding feared identities $M = 1.86$, $SD = 1.16$). Using the coding scheme developed by Oyserman and Saltz (1993), responses were content coded by two independent coders blind to condition, with inconsistencies discussed to consensus. When content was coded, school-focused (78.2%), social (14.5%), and personality traits (3.3%) were the most common future identities. We excluded the four children who did not understand the change-making task and the child whose score was four standard deviations from the mean on this task, and then looked to see if gender, generational status, or age might affect our identity and performance variables. The only relationship we found was between age and change-making performance (older children did better on the task than younger ones). Given the skewed age distribution, we included a younger (≤ 11 , $n = 49$) vs. older (≥ 12 , $n = 25$) age factor in the change-making analysis reported below.

Results

Assignment to condition significantly influenced how many school-focused possible identities and strategies to work on them children reported, as reflected in a significant analysis of variance $F(1, 72) = 10.31$, $p = .002$, $d = .75$.¹³ As shown in Figure 4, school was a more salient future identity for experimental ($M = 7.78$, $SE = .51$) than for control group children ($M = 5.50$, $SE = .50$). This general finding was consistent whether we looked at number of positive expected school-focused possible identities ($F(1, 72) = 4.35$, $p = .041$), number of negative feared school-focused identities ($F(1, 72) = 5.62$, $p = .020$), number of strategies to attain school focused possible identities ($F(1, 72) = 6.35$, $p = .014$), or number of strategies to avoid becoming like feared school-focused identities ($F(1, 72) = 7.43$, $p = .008$). The effect of our interpretation-of-

¹³ Keeping the four children who failed the manipulation check in the analyses did not change the pattern of effects. For the possible selves measure, $F(1, 76) = 9.98$, $p = .002$, $d = .72$, and for the math task, $F(1, 69) = 3.30$, $p = .074$, $d = .43$.

difficulty-at-school condition was specific to school-focused identities and strategies; it did not affect possible identities and strategies that were not about school ($p = .725$).

Effects were in the expected direction but less strong for the change-making task. As shown in Figure 5, performance on the change-making task improved at trend-level for experimental ($M = 4.17$, $SE = .43$) compared to control children ($M = 3.01$, $SE = .46$), as reflected in our analyses of covariance $F(1, 65) = 3.39$, $p = .070$, $d = .45$.¹⁴

Discussion

As predicted, children given an interpretation of their experienced difficulty at school as signaling importance focused more on school than children provided no interpretation of their experienced difficulty at school. This effect was significant for salience of school-focused possible identities and strategies to attain them. Presumably, children in the control condition were more likely to interpret their difficulty at school as signaling that success was not a possible identity and so they should turn their attention elsewhere.

Study 1 had some limitations. First, the condition effect was significant only at trend-level for the change-making task, perhaps because change-making is not only a school task but a task of daily life outside of school. We address this limitation in Studies 2c and 3. Also, our manipulation may have influenced motivation in ways other than through an interpretation of experienced difficulty. At the same time, our manipulation did not explicitly focus on control group children's interpretation of difficulty. We also address these limitations in Studies 2c and 3. Because interpretation of difficulty as impossibility has some conceptual overlap with

¹⁴ As reported earlier, age was included as a factor since older children did better on the change-making task ($F(1, 67) = 4.15$, $p = .046$). Age and condition did not interact ($p = .489$). Without age as a factor, analyses were in the same direction, $F(1, 67) = 3.17$, $p = .080$.

Dweck's (1999, 2006) formulation of the fixed or malleable nature of ability, we first outline this potential overlap and then address it in Studies 2a and 2b.

Mindsets and Interpretation of Difficulty

If something is impossible, it might be because it is impossible for everyone, or because the skills necessary to make it possible are skills one does not or cannot possess. This latter possibility implies that interpreting difficulty as signaling impossibility should be positively correlated with believing that ability is fixed and negatively correlated with believing that ability can be improved incrementally with effort. While the association between these lay theories about difficulty and ability has not yet been tested, Dweck (e.g., 1999, 2006) and her colleagues (Blackwell, Trzesniewski, & Dweck, 2007) have empirically demonstrated that believing ability is fixed rather than malleable undermines performance after failure.

In order to keep trying or to increase effort in the face of difficulty, identity-based motivation theory predicts that difficulty needs to be interpreted as signaling task importance. The lay theory involved is that important tasks are often difficult, that is part of what makes succeeding at them worth the effort. Dweck (1999) provides an alternative possibility, which is that in order to keep trying or to increase effort in the face of difficulty, ability must be seen as malleable. These two lay theories (ability is malleable, difficulty signals task importance) are likely to be uncorrelated since interpreting ability as malleable implies that effort could matter (difficulty does not mean impossibility) but it does not necessarily imply that the goal is an important one and worth pursuing. However, the alternative lay theories (ability is fixed, difficulty signals task impossibility) may well reside in overlapping associative networks since interpreting ability as fixed does imply that effort does not matter (difficulty means impossibility). We provide an initial test of these assumptions empirically in Studies 2a and 2b.

Then in Study 2c we return to field testing the consequences of interpretation of experienced difficulty on school performance.

Study 2a

Sample

Fifty students were stopped on campus and 74 participants were recruited online through Mechanical Turk (MTurk). In both cases, questionnaires were fully anonymous, no demographic information was collected.

Procedure

Students were asked to fill out a two-minute one-side-of-a-page questionnaire. The instruction was that there was no right or wrong answer and that they should rate their level of agreement or disagreement (1=*strongly disagree*, 7=*strongly agree*) with each statement. MTurk adults were recruited to complete a similar short survey on a single screen on the computer for a nominal fee. In this version, the response scale was simplified by removing the neutral midpoint (1=*strongly disagree*, 6=*strongly agree*).

All participants rated 20 statements (listed in full in Figure 6). Twelve items involved interpretation of difficulty (as importance, as impossibility, six items each) and eight items involved belief about intelligence (as malleable, as fixed, four items each from Dweck, 1999). Questions for students and adults were identical except that student items focused on school and intelligence and adult items focused on tasks and ability in general. Though Dweck (1999) reverse codes intelligence as malleable items to yield a single intelligence as fixed (not malleable) score, we maintained each scale separately to test our predictions.

Results

For ease of interpretation, we present the data for students and adults separately. As can be seen, results for students and adults are the same; people agree more that experienced difficulty should be interpreted as meaning task importance than task impossibility and they agree more that ability is malleable than that it is fixed. Scale reliabilities, means, and paired t-tests are presented in Figure 6. In addition, as can be seen in Figure 7, the two interpretation of difficulty scores were not correlated with each other ($p = .166$ for students, $p = .411$ for adults). Moreover, interpreting school (task) difficulty as implying school (task) importance is also not correlated with beliefs about the fixed or malleable nature of intelligence or ability (r s are essentially zero, ranging from .006 to .06). The two ability (intelligence) scales are highly correlated (r s = .76, p s < .001 for students and adults). Finally, with regard to interpreting difficulty as implying school (task) impossibility, the interpretation of difficulty as impossibility score was significantly though modestly positively correlated with the intelligence is fixed score and at trend-level negatively correlated with belief that intelligence is malleable score. This pattern was in the same direction but weaker in the adult sample.

Discussion

We predicted that to be sensitively attuned to situational constraints and affordances requires two interpretations of what experienced difficulty means. Difficulty could mean importance or impossibility, depending on environmental cues. These lay theories should be unrelated and they are, as demonstrated by the fact that extent of endorsement of one lay theory is uncorrelated with endorsement of the other. This pattern fits our assumption that people need to be sensitive to both possibilities since both are needed for good functioning.

We also predicted and found that interpretation of difficulty as importance is uncorrelated with lay theories about the fixed or malleable nature of ability and intelligence. This pattern fits

our assumption that experienced difficulty can be motivating if the accessible lay theory is that difficulty is a signal of importance. Importance is not the same as believing that ability is malleable. Finally, we found a modest significant correlation between interpreting task difficulty as task impossibility and believing that intelligence or ability is fixed. This pattern fits our assumption that one way a task can be impossible is that one cannot attain the skill set needed to make the task possible. As Dweck's (1999) theory implies, the belief that intelligence (ability) is fixed strongly and negatively correlates with the belief that intelligence (ability) is malleable.

A limitation of Study 2a is that it is correlational. Thus, it cannot test the possibility that a particular interpretation of difficulty is primed by considering ability in a particular way (as fixed or as malleable) or the reverse, that a particular way of considering ability is primed by a particular interpretation of difficulty. To test the possibility that one set of beliefs activates the other set of beliefs, in Study 2b we manipulate the accessibility of an interpretation of experienced difficulty or of a belief about ability by using a question order manipulation. If accessible belief about ability shares an associative network with interpretation of difficulty as impossibility, then mean endorsement of difficulty as impossibility items should increase after considering ability as fixed and not malleable. The reverse might also hold; mean endorsement of ability as fixed and not malleable items should increase after considering difficulty as impossibility. If accessible belief about ability does not share an associative network with interpretation of difficulty as importance as Study 2a would suggest, then no change in endorsement of importance items should occur after considering ability as malleable and not fixed and vice versa.

Study 2b

Sample

N=322 (70.5% male, $M_{\text{age}}=27.5$, $SD_{\text{age}}=8.4$) participants were recruited online through MTurk.

Procedure

Participants were randomized to a 2 (order) x 2 (importance or impossibility) x 2 (fixed or malleable) design. In spite of our effort to keep cell size equal via randomization, cell size varied a small amount across the eight cells (importance then fixed $n = 42$, importance then malleable $n = 42$, impossibility then fixed $n = 40$, impossibility then malleable $n = 40$, fixed then importance $n = 41$, fixed then impossibility $n = 37$, malleable then importance $n = 38$, malleable then impossibility $n = 42$).

The order factor reflected that participants completed either an interpretation of experienced difficulty subscale (6 items from Study 2a) or a belief about intelligence subscale (4 items from Study 2a) first. The importance or impossibility factor reflected that participants either completed the 6 item interpretation of difficulty as importance subscale or the 6 item interpretation of difficulty as impossibility subscale. The fixed or malleable factor reflected that participants either completed the 4 item ability as fixed subscale or the 4 item ability as malleable subscale. This between-participant design allowed a series of between-subject comparisons to determine whether participant response to one subscale was affected by the accessibility (due to order of presentation) of the other. Instructions were identical to Study 2a and a 6-point response scale was again used.

Results

We used analyses of variance to test whether mean endorsement of interpretation of experienced difficulty items shifted as a function of accessibility of beliefs about ability and the reverse. An accessible theory of ability as fixed or malleable did not have downstream effects on

interpretation of difficulty as importance ($F(2, 160) = .021, p = .980$) or as impossibility ($F(2, 155) = 2.26, p = .108$).¹⁵ The reverse was also true; an accessible interpretation of experienced difficulty as signaling task importance or impossibility did not have downstream effects on beliefs about ability as malleable ($F(2, 159) = 1.12, p = .328$) or fixed ($F(2, 157) = .41, p = .666$). As summarized in Figure 8, the scale means parallel those in Study 2a. Between participants, interpretation of difficulty as importance is more highly endorsed than interpretation of difficulty as impossibility ($F(1,155) = 32.69, p < .001$), and ability is more likely to be rated malleable than fixed ($F(1,162) = 96.09, p < .001$). Means do not vary significantly by the order of scale presentation or by which mindset was first made accessible.

We followed up with an examination of the pattern of correlations between scales, finding the same pattern as in Study 2a. Thus, the difficulty implies importance subscale was not correlated with the ability as fixed ($r = -.12, p = .271$) or ability as malleable scales ($r = .15, p = .185$) while the difficulty implies impossibility subscale was modestly but significantly associated with the ability as fixed ($r = .24, p = .034$) and malleable ($r = -.26, p = .017$) subscales.

To further explore whether the constructs are associated in memory, we looked at the correlations as a function of order. First, we looked at the difficulty implies importance items. If presented before ($r_{\text{fixed}} = -.15, p = .351; r_{\text{malleable}} = .15, p = .338$) or presented after ($r_{\text{fixed}} = -.09, p = .580; r_{\text{malleable}} = .15, p = .376$) the ability items, the pattern was consistent; they are not correlated. Second, we looked at the difficulty implies impossibility items. In this case we found that considering difficulty as impossibility before considering ability suggests that the constructs

¹⁵ Examination of the means shows that considering ability as fixed or as malleable results in nonsignificantly *lower* endorsement of experienced difficulty as signaling task impossibility, the reverse of what would be expected if the two constructs were highly overlapping.

are not associated ($r_{\text{fixed}} = .11, p = .519; r_{\text{malleable}} = -.23, p = .148$). However, if participants first considered ability as fixed or malleable, then that did have some effect on interpreting difficulty as impossibility ($r_{\text{fixed}} = .37, p = .025; r_{\text{malleable}} = -.26, p = .100$). As before, the correlations are not overwhelming, but do suggest that there may at least sometimes be an overlap in the associative networks. Once interpretation of ability is on one's mind, considering difficulty as implying impossibility might also come to mind. Consistent with Study 2a, this is not the case for interpretation of difficulty as importance. This interpretation does not appear to be associated with beliefs about ability.

Discussion

Study 2b results support our prediction that interpretations of experienced difficulty and beliefs in the malleability of traits represent separate constructs and are not part of a closely linked cognitive network of associations. Thus, cuing an interpretation of difficulty does not affect mean endorsement of trait malleability and cuing beliefs about trait malleability does not affect mean endorsement of the meaning of experienced difficulty. Looking at the patterns of correlations, we replicate the pattern of results found in Study 2a, again indicating that interpretation of difficulty as importance is uncorrelated with beliefs about ability as being fixed and not malleable and finding a modest and sometimes significant correlation between interpretation of difficulty as implying task impossibility and beliefs about ability as being fixed and not malleable.

Moving beyond the correlational results of Study 2a, in Study 2b we found some indication of an order effect. As predicted, if something is impossible there are a variety of reasons it might be so – thinking that experienced difficulty implied task impossibility was not associated with later thinking that ability is fixed and not malleable. On the other hand, if ability

is fixed and not malleable that could imply that difficulty means impossibility. We did find a correlation between thinking about ability and later thinking that experienced difficulty implied task impossibility.

Thus Studies 2a and 2b provide support for our predictions. First, interpretation of difficulty as importance and beliefs about ability are distinct. Second, interpretation of difficulty as importance and impossibility are orthogonal. Third, there is some association between interpretation of difficulty as impossibility and beliefs about ability, but not so high an overlap as to make the case that the constructs are redundant. In Study 2c we return to the effect of accessible interpretation of experienced difficulty on school performance. To manipulate accessible interpretation of experienced difficulty we use a simplified version of interpretation of difficulty scales from Studies 2a and 2b.

Study 2c

Sample

All 7th and 8th grade students in five health classes ($N = 93$; 58% boys, $M_{age} = 12.96$, $SD = 0.69$) in a school near Detroit participated. Most were African American (76%) or multi-racial (20%, 4% other minority) and low-income (71% of the student body received free or reduced lunch).

Procedure

We randomized children to one of three conditions (importance $n = 33$, impossibility $n = 31$, control $n = 29$). Students were randomized to condition at the start of each class. The study took about half an hour (the class period) and was administered in class by passing out to each child a booklet entitled "Middle School and Beyond." All booklets had identical covers so the existence of conditions was unknown to participants.

Condition manipulation. The condition manipulation was located on the flip side of the cover page and used a simplified 4-item version of the interpretation of difficulty (as importance, as impossibility) scales tested in Studies 2a and 2b with the same 6-item response scale (1=*strongly disagree*, 6=*strongly agree*). The full manipulation is located in Appendix B. Example items by condition are: *You can use your feelings about working on a school task to tell you how important it is for you. If you keep working even when it feels hard, it's probably important to you* (importance condition) and *Sometimes, working on a school task feels very difficult – impossible really. That's okay, because finding out that you are not likely to be successful can be helpful for moving on to other tasks* (impossibility condition).

Performance measure. Control participants ($n = 29$) went directly to the dependent variable which was six problems taken from the Raven's Progressive Matrices Test (1962). Each problem showed a pattern of eight images and asked participants to choose how to complete the pattern from among eight options. Items were chosen such that the first three items (Set 1 $M_{Correct} = 66.7\%$, $SD = 38.1\%$) came from earlier in the full test and constituted the easier half of the task, while the last three items (Set 2 $M_{Correct} = 42.3\%$, $SD = 34.5\%$) came from later in the full test and constituted the more difficult half of the task.

Control variables. After completing the Raven's items, we asked participants how difficult it was for them to solve the task (1 item) from 1=*extremely hard* to 7=*extremely easy* ($M = 4.92$, $SD = 1.82$), then asked their age, gender, and their expected grade in the health class in which the study was conducted.

Interpretation of difficulty scales. Finally we had all participants fill out two four item interpretation of difficulty scales. The scale items are located in Appendix B. To create these scales, we used the items from the scales developed for Studies 2a and 2b and rewrote them to be

age appropriate. As can be seen in Appendix B, these scales were similar to but not exactly the same as the experimental manipulations. Given time constraints, we limited scales to four items instead of the six used in Studies 2a and 2b. Perhaps for this reason, scale reliabilities were modest (see Appendix B).

Preliminary Analyses We used ANOVA and linear regression to explore possible effects of our control variables on Raven's performance overall. Two had no effect (age $p = .173$, and gender $p = .957$). Two had an effect so we controlled for them in our final analyses, presented next. The controls that mattered were finding the Raven's easier (unstandardized $\beta = .651$, $p = .001$) and expecting to get a good grade in one's health class (unstandardized $\beta = .439$, $p = .032$). Both were associated with better performance.

Results

We used an analysis of covariance to examine the effect of salient interpretation of difficulty on performance¹⁶. Accessible interpretation of difficulty mattered if the task was difficult ($F(2, 88) = 3.32$, $p = .041$ ¹⁷, not if it was easy ($F(2, 88) = 1.29$, $p = .280$)¹⁸.

Interpretation of difficulty influenced performance if the task was difficult so there was difficulty to interpret, not otherwise. Figure 9 shows percentage correct in Set 1 (easy) and Set 2 (difficult) by condition.

On the difficult portion of the task, children assigned to the interpretation of difficulty as importance condition ($M_{Correct} = 53.7\%$, $SE = 5.6\%$) outperformed children in the other two

¹⁶ Participants responded to the difficulty as importance items ($M = 5.08$, $SD = .68$) with more explicit endorsement than the difficulty as impossibility items ($M = 3.02$, $SD = 1.02$). Interestingly, extent of explicit endorsement of the items was not correlated with overall performance on the Raven's items (importance, $r = .08$, $p > .6$; impossibility, $r = -.16$, $p > .3$), indicating that the manipulation activated a difficulty mindset which influenced behavior, but not explicitly.

¹⁷ Effects were in the same direction without covariates, $F(2, 90) = 2.92$, $p = .059$.

¹⁸ None of the paired contrasts were significant either, ps ranged from .15 to .84.

conditions by almost 30% ($M_{Correct} = 36.0\%$, $SE = 4.1\%$), $F(1, 89) = 6.53$, $p = .012$, $d = .57$).

Paired contrasts showed that children in the interpretation-of-difficulty-as-importance condition outperformed children in the interpretation-of-difficulty-as-impossibility condition ($p = .018$, $d = .61$) and at trend-level children in the control condition ($p = .055$, $d = .50$). Control and interpretation-of-difficulty-as-impossibility conditions did not differ from each other ($p = .680$).

Next we examined responses to the interpretation of difficulty scales. As predicted and replicating Study 2a, responses to the two scales were not correlated ($r = .124$, $p = .238$).

Children agreed more that difficulty means importance ($M = 4.92$, $SD = .89$) than that it means impossibility ($M = 2.91$, $SD = .94$), $t(91) = 15.85$, $p < .001$.

Follow-up regression analyses showed that scores on the interpretation of difficulty scales were not associated with Raven's performance (Set 1 importance $p = .487$, impossibility $p = .593$; Set 2 importance $p = .264$, impossibility $p = .710$). Scores on the interpretation of difficulty scales were also not influenced by random assignment to condition (importance items $p = .876$, impossibility items $p = .608$).

Discussion

To test the effect of accessible interpretation of experienced difficulty on school task performance, we divided children randomly into three groups. The first group was provided a difficulty-signals-task-importance cue, the second group was provided a difficulty-signals-task-impossibility cue, and the third group was not provided any cue at all. Then all children completed a six item task. On first three items, the easy portion of the task, there was no difficulty to interpret and no effect of condition. On the second three items, the difficult portion of the task, children in the difficulty-signals-task-importance condition outperformed children in

the other two conditions. Children in the difficulty-signals-task-impossibility condition performed like children in the control group.

That making salient an interpretation of difficulty as importance facilitates performance relative to control implies that this interpretation of experienced difficulty was not chronically accessible but was available in memory. In other words, it was there, just not currently being used. This way of understanding what our results imply is further strengthened by our finding that children (like the adults and students in Studies 2a and 2b) believe that difficulty working on tasks implies that the task is important more than it implies that the task is impossible. However, as we demonstrated in Study 2c, this belief alone does not predict behavior. Rather, it has to be cued prior to engaging in a difficult task for it to have an effect. We also found that an interpretation of difficulty matters only if the task is difficult. This may be an additional reason for why the effect of interpreting difficulty as importance was only significant at trend-level in the change-making task we used in Study 1. To assess the stability of our results, in Study 3 we used the same manipulation we used in Study 2c but an alternative school task, performance on a standardized writing task. Writing well under time pressure is difficult, and writing is clearly a school task. To ensure ecological validity, we used sample materials from a standardized test children actually take, the Michigan Educational Assessment Program (MEAP) test, to obtain a writing sample and to score writing proficiency.

Study 3

Sample

Participants ($N= 175$, 43% boys) were 6th graders ($M_{age} = 11.67$, $SD = 0.58$, 69% African American, 25% multiracial, 6% other minority) in eight language arts classes in the same low-income, Detroit-area school as in Study 2c. Analyses focus on the 163 children (45% boys, M_{age}

= 11.66, $SD = 0.58$, 68% African American, 26% multiracial, 6% other minority) who provided complete information on all questions and measures.

Procedure

Randomization (using class list provided by classroom teacher) and manipulation (biased scale located on the flipside of the survey booklet cover) followed Study 2c exactly. Absences led to somewhat imbalanced cell sizes (difficulty-as-importance $n = 51$, difficulty-as-impossibility $n = 59$, control $n = 53$).

Performance measure. After responding to the 4-item biased scale, participants read a writing-prompt with instructions from the MEAP. The essay topic “Making a Difference” and specific topic instructions followed the format of the MEAP. Students had the class period to write, just as in the MEAP.

Control variables. After finishing the essay, we asked students, "How hard did you try on your essay" (1 = *I did not try at all*, 5 = *I tried very hard*, $M = 3.78$, $SD = 1.04$), and to report their age, gender, and expected grade in their Language Arts class.

Preliminary analyses. Essay quality was coded by an independent rater blind to condition. Quality rating (1 = *low*, 4 = *advanced*) used the five MEAP writing criteria (does the essay address the question topic, present a thorough explanation, provide appropriate detail (no irrelevant detail), tell a coherent story with logical progression and flow, and show advanced writing ability). The 5 items yielded a reliable scale ($\alpha = .96$) and were averaged together to form an overall essay quality score. To ensure the reliability of our coding scheme, another independent rater blind to condition coded 20% of the sample selected at random ($n = 35$) using the same criteria. Inter-rater reliability was good ($\alpha = .87$). In addition to quality code, we also coded the number of words ($M = 94.39$, $SD = 53.79$) and number of sentences ($M = 6.65$, $SD =$

4.48) in the essay. Preliminary analyses showed that gender, expected language arts grade, how hard one tried, and number of words and sentences were all associated with essay quality. Thus, these variables were included as controls in our final analyses, reported below.¹⁹

Results

Analyses of covariance showed that students in the difficulty-as-importance condition²⁰ ($M = 2.60$, $SE = .08$) outperformed students in the other two conditions combined, $F(1, 156) = 6.23$, $p = .014$, $d = .43$. The effect of condition was significant overall $F(2, 155) = 3.43$, $p = .035$ ²¹, and replicating Study 2c, students in the control ($M = 2.31$, $SE = .08$) and in the difficulty-as-impossibility condition ($M = 2.40$, $SE = .08$) did not differ from one another ($p = .425$). Results are displayed graphically in Figure 10.

Discussion

Children led to interpret their experienced difficulty as implying task importance wrote better quality essays than children given no interpretation of their experienced difficulty or an interpretation of experienced difficulty as implying task impossibility. Performance did not differ among children in these latter two conditions. Just as in Study 2c, accessible interpretation of

¹⁹Girls ($M = 2.76$, $SD = .75$) wrote better essays than boys ($M = 2.03$, $SD = .65$; $F(1, 161) = 43.02$, $p < .001$), as did children who expected a higher grade in their class (unstandardized $\beta = .329$, $p < .001$), children who said they tried harder on the essay (unstandardized $\beta = .408$, $p < .001$), and children who wrote more words (unstandardized $\beta = .009$, $p < .001$) and more sentences (unstandardized $\beta = .102$, $p < .001$).

²⁰As in Study 2c, participants responded to the difficulty as importance items ($M = 4.76$, $SD = .86$) with more explicit endorsement than the difficulty as impossibility items ($M = 3.40$, $SD = 1.11$). Extent of endorsement of the importance items did correlated with overall essay quality, $r = .31$, $p = .029$, and was trend level for impossibility items, $r = -.24$, $p = .072$.

²¹Results are in the same direction when only controlling for words and sentences, $F(1, 158) = 2.82$, $p = .063$. Contrasts show participants in the difficulty as importance condition performing better than those in the control ($p = .012$) and difficulty as impossibility condition ($p = .077$), but the latter two conditions do not differ from one another ($p = .43$).

experienced difficulty as implying task importance improved performance on a difficult school task.

GENERAL DISCUSSION

We opened with a set of observations. First, attaining goals is often difficult, second, this difficulty can imply that a goal is important to attain or that it is impossible to attain, and third, being sensitive to both possible signals is rooted in an evolutionary press for survival (Charnov, 1976; Nesse, 2009). That is, experienced difficulty could be a signal to redouble effort or to shift attention. Since how difficulty is interpreted has implications for attention and effort, people should be sensitive to signals of difficulty and to contextual cues as to what difficulty means. Which interpretation of experienced difficulty comes to mind should be a function of which one is triggered through spreading activation following processing of contextual signals, a process that is not necessarily conscious or dependent on systematic processing (for relevant dual processing models, see Eagly & Chaiken, 1993; Gawronski & Bodenhausen, 2011; Strack & Deutsch, 2004). This sensitivity is necessary because otherwise people would either fail to invest sufficient effort on important goals or perseverate, squandering alternative chances by focusing too much effort on impossible goals.

Building on this account, we made two predictions. First, that people will have two potential interpretations of what experienced task difficulty implies available to them in memory. Second, that which of these interpretations is accessible in the moment will have consequences for judgment (which identities come to mind) and behavior (what people do in response to experienced difficulty). If the accessible interpretation is that difficulty implies that the task is important for oneself, then task-related identities should come to mind and task-related engagement and performance should increase. If the accessible interpretation is that difficulty

implies that the task is impossible for oneself or if context does not provide a clear signal as to which interpretation of difficulty is relevant, unrelated identities could just as well come to mind and task-related engagement and performance will suffer.

In three studies we directly manipulated which interpretation of difficulty came to mind. We demonstrated the predicted effects of accessible interpretation of difficulty on school-focused identities and performance in three samples of low-income minority children (Studies 1, 2c, 3). When asked, children, like adults and students, endorse an interpretation of difficulty as implying task importance significantly more than they endorse an interpretation of difficulty as implying task impossibility (Studies 2a-2c). However, the two interpretations are not correlated, suggesting that they are not located in the same associative network in memory (Studies 2a, 2c).

Moreover, only the activated interpretation of experienced difficulty influences behavior. Thus, children provided a signal that their experienced difficulty in school implied that schoolwork is important to them subsequently described more school-focused future identities and performed better on school-relevant tasks. Effects were targeted. No effect of condition was found for identities not related to school (e.g., social relationships) and behavioral effects were stronger if the task was clearly a school task than if it was a task that might also be relevant in other settings.

Across studies, it was interpretation of difficulty as importance that stood out as promotive of better outcomes. Children's performance and identities were sensitive to cues that experienced difficulty signaled importance. Identities became more school-focused and performance improved in this condition compared to both control and interpreting difficulty as impossibility conditions. Belief in difficulty as importance was found to be orthogonal to beliefs about whether intelligence is fixed or malleable (Studies 2a and 2b). We did not find a

significant difference in the performance of children provided an interpretation of experienced difficulty as implying that the task was impossible for them and children not provided any interpretation of their experienced difficulty at all.

Interpreting difficulty as importance is likely to be both universally culturally syntonetic and syntonetic with particular cultural practices in any given society. In the U.S., seeing difficulty as importance might be in sync with a variety of American and minority-specific cultural values and ethics, including the value placed on hard work, a “no pain, no gain” ethic, and ‘John Henryism’ (see James, Hartnett, & Kalsbeek, 1983). This should also be the case in other cultures since both interpretations of difficulty are rooted in an evolutionary press for survival.

Our results are relevant to a number of complementary perspectives on motivation. First, consider theory and research on the consequences of beliefs about the malleability of ability (Dweck, 2006). While interpreting experienced difficulty as meaning that a task is impossible is associated with perceiving ability as fixed (Dweck, 2006), interpreting experienced difficulty as meaning that a task is important is not associated with beliefs about ability at all. Indeed, as would be predicted from the notion that both interpretations of experienced difficulty are necessary for survival, interpreting experienced difficulty as meaning that a task is important is not correlated with interpreting experienced difficulty as meaning that a task is impossible.

Next, consider theory and research on processing ease and difficulty. While prior research has demonstrated effects of making processing easy or difficult on school task performance, it has not manipulated interpretation of difficulty directly (e.g. Koriat, 2008; Diemand-Yauman, Oppenheimer, & Vaughan, 2011). This means that prior research does not allow for a direct test of the underlying process. By manipulating interpretation of difficulty, our

results imply that performance is enhanced if experienced difficulty is interpreted as task importance.

Our model and findings are also compatible with research on the effects of arousal (Jamieson, Nock, & Mendes, 2012) and of stereotyping (Steele, 1997) on task performance. Of course interpretation of experienced difficulty is not explicitly manipulated in these studies. However, we expect that interpretation of experienced difficulty at least partially explains why arousal and stereotyping might impair test performance if an interpretation of experienced difficulty as signaling task importance is not provided. To the extent that a difficult task in a stereotyped domain and one's associated feelings must be interpreted, which interpretation comes to mind provides a clue as to what difficulty might imply.

Our studies are also relevant to expectancy-value formulations which focus on the motivational potential of valuing education and expecting to do well on school tasks (e.g. Eccles, et al., 1983; Feather, 1982). Difficulty is relevant to expectancy-value formulations because task difficulty can reduce expectations of success. However, whether a low expectation of success necessarily undermines motivation is a matter of contention (Shah & Higgins, 1997). Rather than focus on difficulty as a feature of the task and its consequences for motivational potential, we focused on motivational arousal (Brehm & Self, 1989). Specifically, we focused on the situated, context-sensitive nature of people's interpretation of their experienced difficulty. In doing so, we suggested that expectations as considered within expectancy-value theory cannot be the full story because experienced difficulty can either promote or undermine goal-relevant behavior depending on how experienced difficulty is interpreted.

We proposed that a salient interpretation of difficulty influenced which identities (school-focused or not) come to mind and what they means for subsequent action. Interpreting difficulty

as importance leads participants to see the worth of a particular task for their identity. It is also possible that interpreting difficulty as importance highlights commitment to a goal (this is difficult, but it is something people like me do, and therefore I should work harder). Fishbach & Dhar (2005) emphasize how commitment leads to inferences about the strength of a goal (i. e., this is a very important goal) and results in action in pursuit of a goal and increased goal focus. Goal commitment is contrasted with goal progress, thinking about how much you have already done, which facilitates goal-inconsistent action and choices and liberates pursuit of alternative goals. While a difficulty as impossibility manipulation may not invoke feelings of progress, difficulty as importance may very well lead to feelings of increased commitment. What is untested is how commitment impacts the salience of important identities. Future research should explore the potential contribution and overlap of commitment and progress research with our current manipulations.

Though seemingly relevant, our results cannot be explained by effort justification effects, though effort justification might help maintain our effects over time. Classic work on cognitive dissonance details effort justification as a phenomenon that helps explain high exertion of effort (see Aronson & Mills, 1959; Axsom & Cooper, 1983; Festinger, 1957). Engaging effortfully in a behavior to achieve a goal typically results in increased preference for that goal compared to if effortful engagement had not been involved. As applied to students in school, those who engage in school work effortfully should justify their effort by convincing themselves they like school and school goals are worthwhile. Our studies aim to bring participants to this point – students will never reap the benefits of effort justification if they never engage in sufficiently high effort. Instead, as our control conditions in Studies 2 and 3 demonstrate, our participants are plagued by low effort, not attempts to understand past exertion. We give participants an interpretation of

difficulty to encourage effortful engagement, rather than have them engage effortfully and wonder why. With any luck, seeing difficulty as importance will bolster effort, after which effort justification can additionally create a preference for academic tasks.

That academic expectations cannot be the full story and that interpretation of difficulty in context matters is also supported by the preponderance of research on the high academic expectations and aspirations of low-income children and their families (for a review, Oyserman, 2013). Expectations are high even among low-income and minority children at risk of school failure (Trusty, 2000). Across studies, low income and minority children asked to describe their expected academic attainment almost uniformly name college (Destin & Oyserman, 2010; Oyserman, Johnson, & James, 2011; for a review, Oyserman & Fryberg, 2006). For example, 72% of children living in families at or below the poverty threshold (currently about \$23,000 for a family of four) aspire to go to college (Elliott, 2009). This percentage is well above the average college completion rate of close to 30% (Elliott, 2009).

Unfortunately, but as we expected, it looks like interpreting difficulty as implying impossibility is the default interpretation in our studies. In trying to understand why that might be, we considered the contexts of low income and minority children. These contexts tend to be segregated so that poor and minority children are more likely to live in racially-ethnically segregated neighborhoods (Massey & Eggers, 1990) with higher than average unemployment and poverty than other children (Bureau of Labor Statistics, 2009). Children in concentrated poverty neighborhoods are likely to attend concentrated poverty schools in which modal performance is not high (Kozol, 2012). This de facto segregation by both race-ethnicity and social class means that poor and minority children are mostly exposed to others whose educational and occupational outcomes are low (Adelman & Gocker, 2007; Krivo, Peterson,

Rizzo, & Reynolds, 1998). Segregation by race-ethnicity and economic status as well as family poverty are each associated with worse academic outcomes for low income and minority children (Bankston & Caldas, 1996; Duncan & Brooks-Gunn, 2000; Hanushek, Kain, & Rivkin, 2009; Orfield, Losen, Wald, & Swanson, 2004; Peterson & Krivo, 1993; Wacquant & Wilson, 1989). Thus, though children can interpret difficulty as implying that the task is important, their contexts may conspire to make an interpretation of difficulty as implying task impossibility more chronically accessible in working memory.

Future Directions

While we believe the current studies make a nice argument for the significance of interpretations of experienced difficulty for motivation, we do acknowledge several questions that could be better answered. First, we argue that effects are identity-based – that interpreting difficulty as importance increases salience of school and career-focused possible selves over other interpretations of difficulty. But only the first study looks at effects for identity, and it does not directly test the full predictions of IBM theory with a manipulation of difficulty as both importance and impossibility. Second, we provide participants an interpretation of difficulty or not. For control condition participants, they are not instructed to think of anything before working on the dependent measures. While comparisons with this condition are interesting, a more stringent test might be to have participants explicitly think of difficulty but provide no interpretation in comparison to conditions with an interpretation. This control would allow us to better explicate what students' typical reaction to difficulty is, and how it is interpreted when it is explicitly brought to mind but not provided with a processing framework. Finally, we argue that effects of the difficulty as importance manipulation are due in part to the spreading activation of effort related cognitions. If this is the case, we should be able to see that concepts related to

effort are more salient to participants in our motivating conditions. Future work addressing these issues may provide useful data to help further explicate the processes underlying the current work.

Conclusion

Identity-based motivation theory predicts that how experienced difficulty is interpreted matters for identity and relevant behavior (Oyserman, 2007). The current studies directly test this prediction, showing that children can and do interpret difficulty differently depending on the cues they are provided and by showing that interpretation of experienced difficulty influences both identity content and behavior. Our results also highlight the importance of associative networks. First, we show that effects are due to the salient interpretation rather than to the explicit endorsement of an interpretation, highlighting that the effect of interpretation of experienced difficulty is likely via an associative process rather than via explicit or systematic reasoning. Second, we show that effects are due to the positive consequence of interpreting difficulty as importance rather than the negative consequence of interpreting difficulty as impossibility. This latter finding implies that the effect of interpretation of experienced difficulty is asymmetric, stronger for bolstering motivation than for undermining it compared to control, at least for the minority children in our samples.

Taken together, our results highlight three core points: first, the importance of taking context into account in understanding how motivation works; second, the subtlety of effects (they cannot be paralleled by just asking for explicit beliefs); and third, the importance of getting context right (the default may be to interpret difficulty in ways that undermine motivation and performance). These three core points are translatable to the needs of educators, policy makers, and parents interested in processes that *improve* school-focused attention and performance, not

just factors that undermine it. Our results demonstrate that providing cues that experienced difficulty should be interpreted as meaning that the task is important and identity-congruent can boost school performance. Our results also demonstrate that what matters is the interpretation of difficulty that comes to mind in the moment, not what one generally believes. All that it takes is a small change in context to shift interpretation and yield performance benefits.

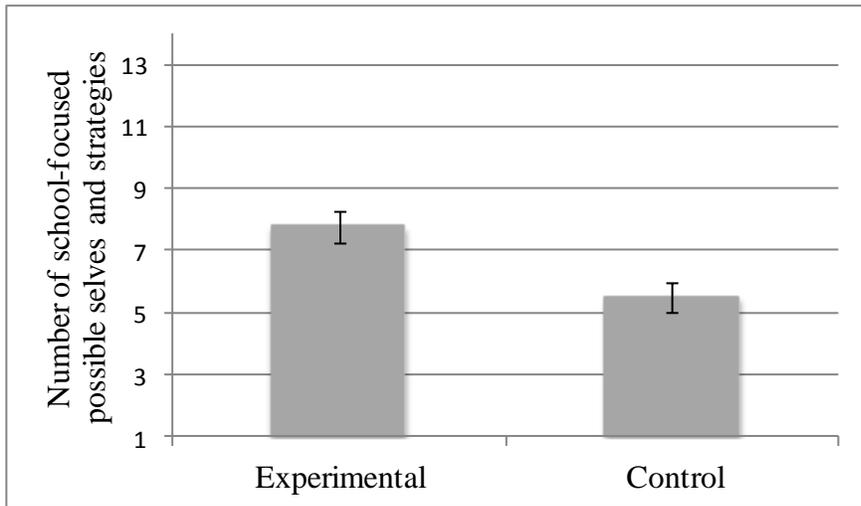


Figure 4. Study 1: Effect of Interpretation of Experienced Difficulty on School-Focused Possible Identities and Strategies To Attain Them.

Note: Count of school-focused responses to the open-ended probe about next year possible self and strategies to attain this possible self (range 1 to 14). Error bars represent standard errors. In the experimental condition, children were provided an interpretation of experienced difficulty in school as meaning that school is important. In the control condition children were not provided an interpretation of experienced difficulty in school.

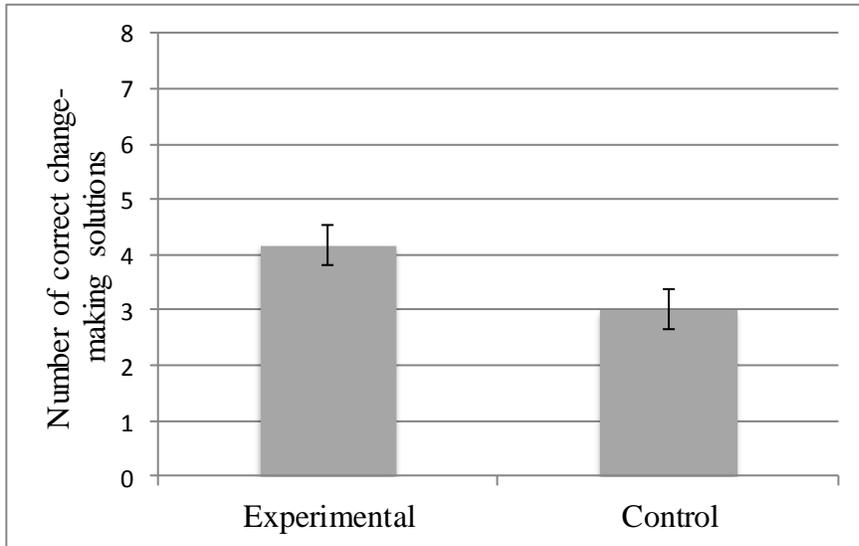


Figure 5. Study 1: Interpretation of Difficulty and Change-making Performance.

Note: Count of number of correct solutions to the change-making problem (how can one use coins to total 63 cents) (range 0 to 14). Error bars represent standard errors. In the experimental condition, children were provided an interpretation of experienced difficulty in school as meaning that school is important. In the control condition children were not provided an interpretation of experienced difficulty in school.

Figure 6. Study 2a: Interpretation of Experienced Difficulty and Intelligence (Ability): Scale Reliability, Means, Standard Deviations, and Mean Differences

Students			Adults		
	Mean (SD)	t-test (df=49)		Mean (SD)	t-test (df=73)
Difficulty on school tasks means school is important ($\alpha = .90$)	3.86 (1.19)	4.57***	Difficulty on tasks means the task is important ($\alpha = .89$)	3.67 (.87)	4.47***
Difficulty on school tasks means school is impossible ($\alpha = .83$)	2.94 (1.08)		Difficulty on tasks means the task is impossible ($\alpha = .81$)	3.03 (.79)	
Intelligence is fixed ($\alpha = .86$)	3.27 (1.40)	3.29**	Ability is fixed ($\alpha = .88$)	2.99 (.96)	5.66***
Intelligence is malleable ($\alpha = .90$)	4.51 (1.44)		Ability is malleable ($\alpha = .88$)	4.14 (.90)	

Note: t-test statistic is for the pairwise comparison within each scale, *** $p < .001$, ** $p < .01$. α = Cronbach alpha (scale reliability), Student sample (N=50, scale ranges from 1=strongly disagree, to 7=strongly agree), Adult sample (N=74, scale ranges from 1=strongly disagree, to 6=strongly agree). For students, interpretation-of-difficulty-as-importance items were: *When you're working on a school task that feels difficult, it means that the task is important; A sign that a school task is important to you is how difficult it feels while working on it. If it feels difficult, it's important; Struggling to complete a school task reminds me that the task is important; If a school task is difficult, it is probably important for you to do well at it; School tasks that feel difficult are important tasks for you; If a school task is difficult, it means that it's important for you.* For students, interpretation-of-difficulty-as-impossibility items were: *When you feel stuck on a school task, it's a sign that your effort is better spent elsewhere; If working on a school task feels very difficult, that type of task may not be possible for you; Sometimes people work at things that just aren't meant for them. If a school task feels too difficult, you should move on to something else; You know that when working on a school task feels hard, that feeling means it's not for you; Finding a school task really difficult tells you that you can't complete that task; If a school task feels really difficult, it may not be possible for you.* For adults, the word school was omitted. The items for the intelligence (ability) scale (Dweck, 1999) were: *You have a certain amount of intelligence, and you can't really do much to change it; Your intelligence is something about you that you can't change very much; To be honest, you can't really change how intelligent you are; You can learn new things, but you can't really change your basic intelligence; No matter who you are, you can significantly change your intelligence level; You can always substantially change how intelligent you are; No matter how much intelligence you have, you can always change it quite a bit; You can change even your basic intelligence level considerably.* For adults, the word intelligence was replaced with ability.

Figure 7: Study 2a: Correlations among Interpretation of Difficulty Subscales and Intelligence

(Ability) Subscales

	School (task) difficulty means importance	School (task) difficulty means impossibility	Intelligence (ability) is fixed	Intelligence (ability) is malleable
	Correlation			
School (task) difficulty means importance	--	.199	-.006	.062
School (task) difficulty means impossibility	-.097	--	.384**	-.270†
Intelligence (ability) is fixed	.038	.252*	--	-.763***
Intelligence (ability) is malleable	-.009	-.168	-.764***	--

Note: Student sample (n = 50) correlations are above the diagonal, adult sample (n = 74) correlations are below diagonal. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p = .058$.

Figure 8. Study 2b: Means, Standard Deviations, and Effect of Order of Presentation

	<i>M (SD)</i>			<i>F</i>	<i>df</i>
	Scale Presented				
Scale	First	After ability is malleable	After ability is fixed		
Difficulty means importance ($\alpha = .93$)	3.42 (0.93)	3.40 (1.04)	3.38 (.83)	.021	(2, 160)
Difficulty means impossibility ($\alpha = .89$)	2.87 (0.88)	2.58 (.82)	2.58 (.87)	2.26	(2, 155)
Scale	First	After difficulty means importance	After difficulty means impossibility		
Ability is malleable ($\alpha = .94$)	4.54 (0.92)	4.49 (0.80)	4.26 (1.16)	1.12	(2, 159)
Ability is fixed ($\alpha = .94$)	2.78 (1.07)	2.68 (1.10)	2.89 (1.07)	.41	(2, 157)

Note: To test whether answering one scale influenced endorsement of the other, adult participants (N=322) were randomly assigned to one of eight conditions so that scale order, which interpretation of difficulty scale, and which ability scale was presented varied across condition. F-statistics compare mean responses to each scale across the three group means listed in each row (*p* values are in the text).

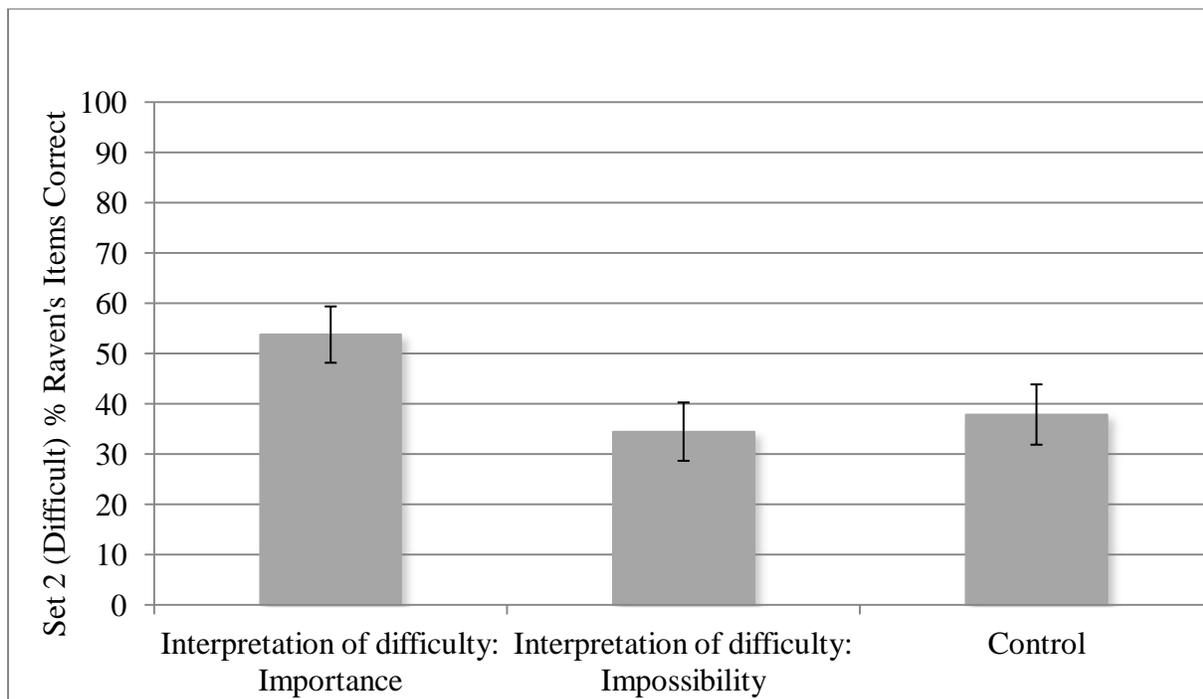
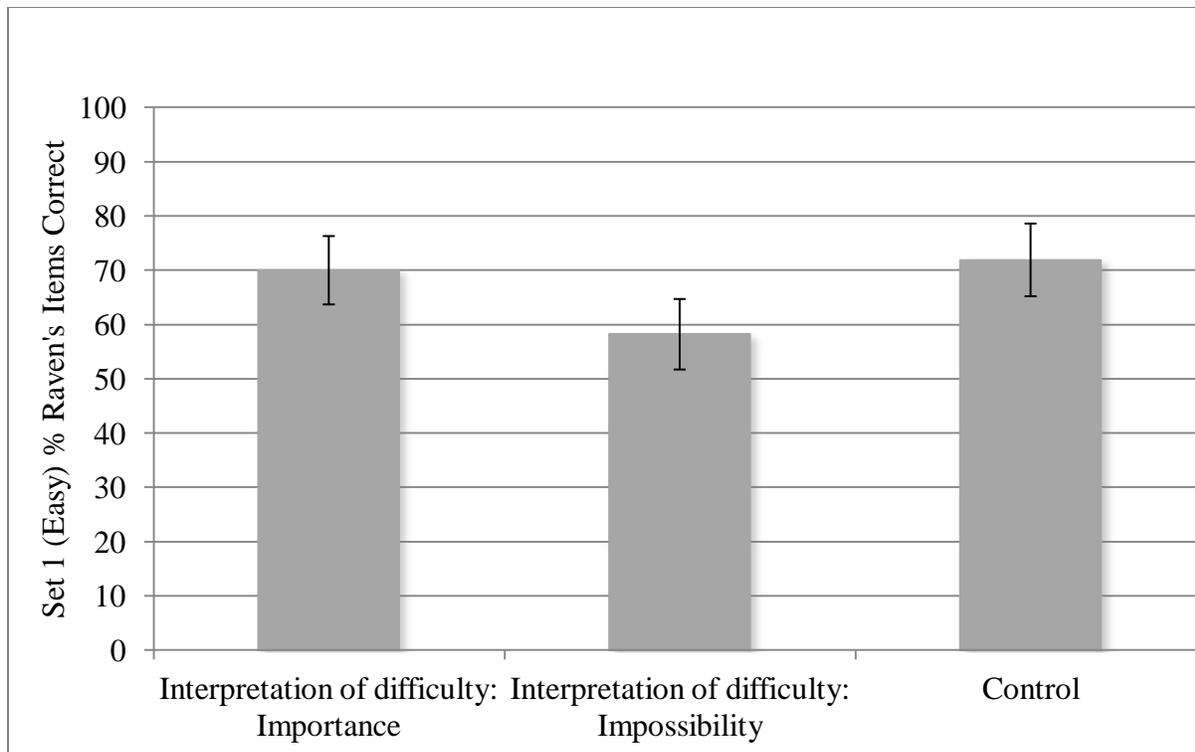


Figure 9. Study 2c: Interpretation of Difficulty and Task Performance on Easy Set 1 and Difficult Set 2 Items.

Note: Error bars represent standard errors. In the experimental conditions, children were provided with a biased scale providing an interpretation of difficulty in school as meaning that success in school is important to them or a biased scale providing an interpretation of difficulty in school as meaning that success in school is impossible for them. In the control condition children were not provided an interpretation of difficulty in school.

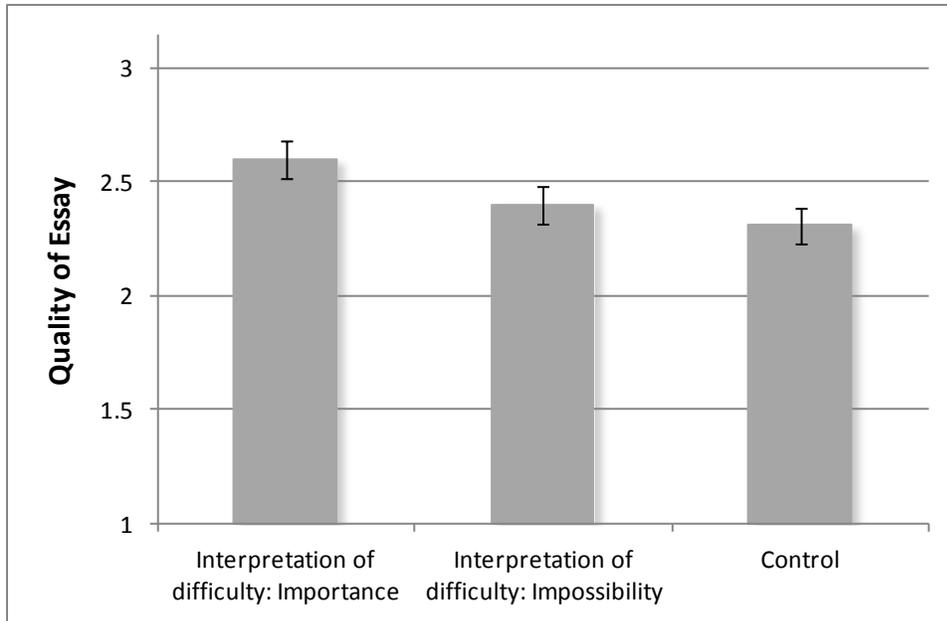


Figure 10. Study 3: Interpretation of Difficulty and Quality of Essay Score.

Note: Error bars represent standard errors Quality rating (1 = low, 4 = advanced) used the five MEAP writing criteria (does the essay address the question topic, present a thorough explanation, provide appropriate detail (no irrelevant detail), tell a coherent story with logical progression and flow, and show advanced writing ability). In the experimental conditions, children were provided with a biased scale providing an interpretation of difficulty in school as meaning that success in school is important to them or a biased scale providing an interpretation of difficulty in school as meaning that success in school is impossible for them. In the control condition children were not provided an interpretation of difficulty in school.

Chapter IV

Just not worth my time? Experienced difficulty and time investment

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ABSTRACT

Even though they value school success, students often fail to devote sufficient time to schoolwork. This may be because of students' (mis)interpretation of their experienced difficulty while studying. Identity-based motivation theory predicts that if experienced difficulty is (mis)interpreted as meaning that school success is identity-incongruent and impossible to achieve, engagement will suffer. In contrast, if experienced difficulty is interpreted as meaning that school success is identity-congruent and important to achieve, engagement will be bolstered. Two studies test these predictions by providing an interpretation of difficulty and manipulating the relative frequency of that interpretation. Compared to other students, students randomly assigned to conditions implying they experienced difficulty as importance relatively more than others or that they experienced difficulty as impossibility relatively less than others viewed investment in academics as more identity-congruent (Study 1), planned to study more (Study 1), and invested more time on a difficult task (Study 2).

Just not worth my time? Experienced difficulty and time investment

American students aspire to get good grades and succeed in college but their attainments often fall short (Rosenbaum, Deil-Amen, & Person 2006; Symonds, Schwarz, & Ferguson, 2011; Trusty, 2000). While a variety of barriers related to social class, race-ethnicity, and gender have been identified as reasons for underperformance (e.g., Jackson, 2010; Orfield, Losen, Wald, & Swanson, 2004; Steele, 1997), these factors do not address underperformance among non-stereotyped groups and do not explicitly focus on time allocation. Yet time use analyses suggest that time use matters. American students spend the lion's share of their time socializing (Arum, Roksa, & Cho, 2011) and only about fourteen hours a week studying, less than half of the recommended amount (Babcock & Marks, 2010). Spending enough time on academics is critical for school success (Allensworth & Easton, 2007; Astin, 1993; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Pascarella & Terenzini, 2005). Students who report investing more time on academics earn higher salaries later on, even controlling for the effect of time investment on their grades while in school (Babcock & Marks, 2010). Why students might under-invest in academics? To address this question, in the current studies we start with the assumption that fully engaging in schoolwork is often experienced as difficult and predict that how students interpret their experienced difficulty should matter for sustaining investment.

Identity-based motivation

In making this prediction, we build on identity-based motivation theory (Oyserman, in press), which predicts that although people prefer to act in identity-congruent ways (consistent with how a personal or social identity is construed in the moment), the identity-to-behavior link is often opaque for a number of reasons. First, even though people might prefer to act in self-consistent ways, the self consists of an array of situated identities rather than a unitary self (see

Cross & Markus, 1991; Swann & Bosson, 2010). Thus, an identity that comes to mind in one situation may not come to mind in another and behavior that fits one identity may not fit another (see also Markus & Kunda, 1986). Second, what an identity seems to imply for action in one situation may not be what it implies in another situation (see Oyserman, Elmore, & Smith, 2012). For example, one's race-ethnicity or gender can feel congruent or incongruent with academic performance, depending on how it is framed (e.g., Elmore & Oyserman, 2012; Shih, Pittinsky, & Trahan, 2006). In the current paper we focus on a particular feature of situations, which is what they imply for how experience, specifically experienced difficulty, should be interpreted and the implication of that for students' belief that academic investment is identity congruent and for students' actual investment in schoolwork. Following identity-based motivation theory, we predict that the same behavior may feel identity-congruent (consistent with one's salient identity) or identity-incongruent (inconsistent with one's salient identity) depending on how difficulty engaging in the behavior is interpreted and that this will have implications for behavior.

Even though students might assume that academic investment is identity-congruent, what matters is whether it feels identity-congruent in the moment and that is contingent in part on how a student interprets experienced difficulty with schoolwork at that point in time. Experienced difficulty on schoolwork will enhance the identity-congruence of schoolwork and increase effort if difficulty engaging in schoolwork is interpreted as signaling that school success is an important goal for oneself. In contrast, experienced difficulty will undermine the identity-congruence of schoolwork and decrease effort if difficulty engaging in schoolwork is (mis)interpreted as signaling that school success is an impossible goal for oneself. In other words, when experienced difficulty is seen as reminder of the importance of school success (“no pain, no gain”) for one's self, time investment in schoolwork should increase, but not if that

same experienced difficulty is seen as a reminder of how hard and ultimately impossible school success is to achieve.

An initial test of the impact of interpretation of experienced difficulty was conducted as a school-based intervention. Low-income students were randomly assigned to either a 7-week (11-class period) intervention or a “school as usual” control group and their academic outcomes tracked over time (Oyserman, Bybee, & Terry, 2006). While all students experienced the usual difficulties associated with being an eighth grader, intervention group students participated in small-group activities designed to activate an interpretation of this difficulty as a normative part of working toward one’s academic possible identities. Control group students went to class as usual and received no structured interpretation of their experienced difficulties. Content of possible identities, school grades, attendance, homework time, and in-class behavior were obtained for both groups. The two groups did not differ on any measure prior to intervention. Post intervention, students in the intervention group were more likely to report that being successful in school was a possible identity and that they had strategies to achieve that identity. They also spent more time on their homework, even a year after the intervention. Their high school teachers reported that they were more engaged in classroom activities, and their schools reported fewer skipped classes. The effect of the intervention on grades, attendance, and academic engagement was mediated by an increase in school-focused possible identities and strategies to attain them.

The intervention demonstrated that interpretation of experienced difficulty can influence both content of identity and behavioral engagement. However, it did not directly test the effect of relative social standing on the implications drawn from salient interpretations of experienced difficulty. As detailed next, one’s standing relative to others forms a potent source of information

about how difficulty should be interpreted for the self. This implies that social comparisons can be an informational source for what experienced difficulty means for one's self. Experienced difficulty should be interpreted as signaling identity-congruence and result in increased effort if it seems that others experience difficulty as implying that the task is important less frequently than one does (or experience difficulty as implying that the task is impossible more frequently than one does). The reverse should also hold true. Experienced difficulty should be interpreted as signaling identity-incongruence and result in decreased effort if it seems that others experience difficulty as implying that the task is important more frequently than one does (or experience difficulty as implying that the task is impossible less frequently than one does). These predictions are discussed next.

Interpretation of experiences

People search for explanations of their experiences using both social comparisons and contextual cues to make meaning (Festinger, 1957; Weiner, 1985). Indeed, people routinely, automatically, and nonconsciously use others as standards of comparison to inform themselves about their own abilities, interests, and desires (e.g., Cialdini & Trost, 1998; Smith & Collins, 2009). Indeed, it could be argued that what people believe about themselves in the moment is a dynamic consequence of what content comes to mind and their standing on this content relative to others (judged implicitly or explicitly).

Schwarz and colleagues have generated a large body of evidence relevant to this point (Schwarz, Bless, Bohner, Harlacher, & Kellenbenz, 1991; Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991; Schwarz, Groves, & Schuman, 1998). Their work shows that people infer from response scale options what the normal distribution of an experience or behavior is. Additionally, people are sensitive to subtle information about the frequency with

which they experience something relative to others, and information about their relative frequency of experience influences their subsequent judgments and actions. If the scale includes high frequency options, the experience or behavior is common. If it includes low frequency options, the experience or behavior is uncommon. The scale influences people's responses to the question (they tend toward the mean) and also influences their subsequent interpretation of what their own behavior implies. As detailed next, the same pattern of behavior can lead to different conclusions about the self, depending on the perceived behavioral frequency of others. In this way, biased frequency scales can be considered as providing informational influence on what the experience of others tends to be, informing what that experience means for the self (Deutsch & Gerard, 1955).

For example, Schwarz and Scheuring (1988) led German adults to believe that they masturbated either more or less often than others. Compared to those in the less condition, those in the more condition later reported lower marital satisfaction. Presumably, they inferred that they must not be satisfied with their marital life; after all, they needed to satisfy their sexual needs outside of their marital relationship more often than they perceived others to do so (Schwarz & Scheuring, 1988). Similarly, American college students led to believe that other students had had more sexual partners than themselves had higher intentions to use condoms, presumably because they inferred they would otherwise be putting themselves at risk given others' promiscuity (Rothman, Haddock, and Schwarz, 2001). These effects were found by having people rate the frequency of their own behavior on a scale that manipulated their sense of typical behavioral frequency. If the frequency on the scale was high, they inferred that their personal frequency was less than average. If the frequency on the scale was low, they inferred that their personal frequency was more than average.

Interpreting experiences of difficulty

Experiences of difficulty are important to explain since difficulty implies that current energy investment is insufficient and investment should either go up to overcome difficulty if the task is identity-congruent and important, or go down so that energy can be used elsewhere if the task is identity-incongruent and impossible (see also Carver & Scheier, 1998). From an evolutionary perspective, both interpretations of difficulty, as a sign of importance or as a sign of impossibility, are logical (Charnov, 1976; Nesse, 2009). Consider difficulty as a sign of identity-congruence and task importance – this signal functions to sustain and even increase effort when faced with difficulty and reduces the chance that opportunities for success are missed. Consider difficulty as a sign of identity-incongruence and task impossibility – this sign functions to channel effort away from an unattainable goal and reduces the chance that resources that could be used to attain another more likely goal are wasted. Thus, sensitivity to experienced difficulty and sensitivity to social and nonsocial cues as to how to interpret experienced difficulty are likely to be rooted in evolutionary necessities to both engage and disengage.

In psychology, the idea that difficulty can increase the intensity of motivation has been discussed at least since William James (1890) and Ach, who discussed it in terms of the will to overcome distraction (as discussed in Brehm & Self, 1989). The role of difficulty in influencing belief in one's abilities to succeed (see self-efficacy theory, Bandura 1988; 1997), in altering expectations for the likelihood of success (see expectancy-value theories, Atkinson, 1966; 1974; Eccles, Adler, Futterman, Goff, Kaczala, Meece, & Midgley, 1983; Feather 1982; 1992; Wigfield & Eccles, 1992), and in impacting motivational potential and motivational arousal (see Brehm & Self, 1989) have all been studied. Difficulty increases motivation and the desirability of a goal – effort is typically low when tasks are easy and increases with task difficulty so long

as difficulty is not so great as to render tasks impossible; in this case, effort quickly declines (e.g., Brehm & Self, 1989; Roese & Olson, 2007; Silvestrini & Gendolla, 2013).

While much of the research on difficulty has assumed that difficulty is a feature inherent to the task or goal being pursued, more recently researchers have taken a situated approach to understanding the effects of task difficulty. In doing so, they focus implicitly or explicitly on the effects of social context in informing interpretation. From a situated cognition approach (Smith & Semin, 2004), interpretation of experienced difficulty is rooted in and should be influenced by context. Jamieson, Nock, and Mendes (2013), for instance, provide evidence that this is the case. In their study, students led to interpret their physiological arousal as a signal that they felt challenge exhibited improved SAT performance compared to students for whom no interpretation of their arousal was provided. We take a similar approach, viewing interpretation of experienced difficulty as conceptually malleable.

The current studies

As reviewed, research to date implies but does not specifically test that the presumed experience of others can be used as an interpretive cue to help understand what experienced difficulty with schoolwork implies for the self and for one's own effort. Comparisons can provide a means of interpreting what a particular example of difficulty might mean more generally for oneself. In the current studies we manipulate experienced frequency using the frequency scale manipulation described previously in the work of Schwarz and colleagues (e.g., Rothman, Haddock, & Schwarz, 2001). High frequency scales (in which one's standing is low relative to others) should imply that the experience is identity-incongruent, while, in contrast, low frequency scales (in which one's standing is high relative to others) should imply that the experience is identity-congruent. Thus, students asked to report on their experience of difficulty

at school on a low frequency scale should be led to believe that they have the experience of difficulty more often than others. This should be motivating if difficulty is framed as implying importance, and demotivating otherwise. In the same way, students asked to report on their experience of difficulty at school on a high frequency scale should be led to believe that they have the experience of difficulty less often than others. This should be motivating if difficulty is framed as implying impossibility, and demotivating otherwise.

In two experiments, we tested the prediction that students will be more invested in their schoolwork if induced to believe that they experience difficulty engaging in school tasks as a signal of importance (impossibility) more frequently (less frequently) than their peers. Each experiment uses the same two interpretation of experienced difficulty (importance, impossibility) by two frequency relative to others (high, low) between-subjects design. In Study 1, we examine effects on identity-congruence of schoolwork, operationalizing identity-congruence as importance of academics to the self, and planned study time. In Study 2, we use the same method to examine effects on actual time investment on a difficult task and its indirect effect on performance.

STUDY 1

Sample and Method

University of Michigan undergraduates ($N = 104$, 63 female, 49 underclassmen) were approached on campus and asked to participate in a 1-page study. Unbeknownst to participants, the instructions on the front of the page were the experimental manipulation and the questions on the back of the page were the dependent measures plus two demographic controls.

Questionnaires were randomized prior to distribution.

Condition instructions read *Experiencing difficulty working on a school task can be thought of as signaling importance [impossibility], that what you are working on is [not] worth your effort because it is important to [it is not for] you. This can be a common occurrence for students. How often have you had the feeling of difficulty as importance [impossibility] in the past month?* In the low frequency relative to others condition, the response scale ranged from ≤ 10 times to ≥ 31 times. In the high frequency relative to others condition the response scale ranged from 1-2 times to ≥ 11 times (see Figure 11).

On the back of the page were the following questions meant to measure identity-congruence of and planning for academic investment: *Doing well in classes in my major is important to me* (1=strongly disagree, 6=strongly agree, $M = 5.51$, $SD = .67$), *Doing well in classes outside my major is important to me* (1=strongly disagree, 6=strongly agree, $M = 4.91$, $SD = .89$), *How likely are you to skip going out/socializing this weekend to prepare for class* (1=not at all likely, 6=very likely, $M = 3.86$, $SD = 1.42$), *Realistically, how many hours do you plan to study tonight?* (open-ended, range 0 – 8, $M = 3.26$, $SD = 1.56$), gender, and year in school.

Factor analysis (varimax rotation) yielded a single factor comprised of the first three items (z-scored), so they were averaged to form a measure of academic identity-congruence ($M = 1.30$, $SD = .75$, range -1.01 – 2.65). The open-ended response on planned study hours was the second dependent measure.

Manipulation check. We verified that our manipulation of frequency worked as expected. Participants reported more frequent experience of difficulty in the high relative to others frequency condition ($F(1, 96) = 3.90, p = .051$)²².

Examination of demographics. Preliminary analyses showed no effect of year in school ($p > .3$) so it was not included in the final analyses reported below. Preliminary analyses did show an effect of gender on both the academic identity-congruence ($F(1, 97) = 4.98, p = .028$) and the planned study time ($F(1, 96) = 7.67, p = .007$) measures, with women scoring higher than men on both. Therefore, we included gender in the final analyses reported below.

Results and Discussion

Interpretation of experienced difficulty and its relative frequency mattered. Analyses of covariance (ANCOVA) revealed a significant interaction between interpretation of experienced difficulty and relative frequency for the identity congruence of academics, $F(1, 94) = 5.38, p = .022$, and for planned study time, $F(1, 93) = 15.15, p < .001$ ²³. Both identity congruence of academics and planned study hours were higher among participants in the high frequency relative to others/difficulty as importance and the low frequency relative to others/difficulty as impossibility conditions who were led to believe they more frequently than others experienced difficulty as importance or less frequently than others experienced difficulty as impossibility.

This pattern can be seen graphically in Figures 12 and 13.

²² Six participants did not mark a response on the frequency scale used in the manipulation check, one each failed to answer the question about importance of classes outside one's major and the question about skipping socializing to study, three did not report their planned study hours, and three did not wish to report their gender. These participants are not included in analyses that involve these variables.

²³ Neither factor showed a main effect for identity congruence of academics (relative frequency condition, $F(1, 94) = 1.38, p = .24$; interpretation of difficulty condition, $F(1, 94) = .07, p = .80$), and were non-significant or trend-level for self-reported study time (relative frequency condition, $F(1, 93) = .11, p = .74$; interpretation of difficulty condition, $F(1, 93) = 3.05, p = .084$).

Follow-up analyses tested our prediction that participants in these two conditions view academics as identity congruent and plan to study more. We combined these two conditions and contrasted them with the other two conditions in which participants were led to believe that they experienced difficulty as importance less than others and difficulty as impossibility more than others. As expected, participants rated academics as more identity-congruent if led to believe that they experienced difficulty as importance more than others or difficulty as impossibility less than others ($M = 1.47$, $SE = .10$) compared to participants led to believe that they experienced difficulty as importance less than others or difficulty as impossibility more than others ($M = 1.13$, $SE = .10$, $F(1, 96) = 5.13$, $p = .026$, $d = .46$). This pattern was also found for planned study hours (motivating conditions $M = 3.80$, $SE = .20$, other conditions $M = 2.69$, $SE = .21$, $F(1, 95) = 14.87$, $p < .001$, $d = .80$).

Thus, the results of Study 1 support the prediction that accessible interpretation of school difficulty influences the identity congruence of academics as well as planned time investment. Students led to believe that they experience difficulty in schoolwork as signaling the importance of schoolwork more than others or that they experience difficulty in schoolwork as signaling the impossibility of schoolwork less than others perceived themselves as more identified with academics and planned to invest more time in studying. These results highlight the socially situated nature of identity and plans. In Study 2 we extend our focus from self-reported to actual time engagement and use a cognitive task that becomes progressively more difficult, the Ravens' Progressive Matrices test of fluid intelligence. Time investment is crucial for performance success on difficult tasks. Presenting such a task allows a direct test of our main prediction. Specifically, we predict that students led to believe that they experience difficulty in schoolwork as signaling the importance of schoolwork more than others (or difficulty in schoolwork as

signaling the impossibility of schoolwork less than others) will actually invest more time on this task. As a follow-up, we test the assumption that time on task reaps benefits of better performance.

STUDY 2

Sample and Method

Introductory Psychology subject pool ($N = 292$, 169 female, 180 underclassmen²⁴) students were randomized to the same conditions as in Study 1, receiving course credit for participating in the Qualtrics programmed ‘difficulty during the college years’ study. Following the experimental manipulation, participants completed the 12-item Bors and Stokes (1998) short form of Raven’s Progressive Matrices (RPM, Raven, 1962). The short form RPM is a test of fluid intelligence (see Conway, Kane, & Engle, 2003; Gray, Chabris, & Braver, 2003) that predicts performance on the full set of Raven’s items. We recorded average time spent on each item ($M = 36.91$ seconds, $SD = 18.96$ seconds) as well as the solution chosen. Because time data can require transformation, we checked skewness (.94, $SE = .14$) and kurtosis (1.58, $SE = .28$). Both were within acceptable limits for a normal distribution so analyses use untransformed (raw) time data. Average time spent and average accuracy were highly positively correlated, $r = .61$, $p < .01$. Demographics questions followed the dependent measures as in Study 1.

Manipulation check. The manipulation of frequency worked; participants reported more frequent experience of difficulty in the high relative to others frequency condition compared to the low relative to others frequency condition, $F(1, 290) = 6.58$, $p = .011$.

²⁴ One participant ran out of time and did not complete the demographics measures; another participant did not wish to disclose his or her gender. These participants are not included in analyses that involve these variables.

Examination of Demographics. Preliminary analyses showed that both being an advanced student (i. e., not a freshman, $F(1, 289) = 2.72, p = .100$) and being male ($F(1, 288) = 6.33, p = .012$) were associated with more time spent on the Ravens, and that being male was also associated with better performance on the Raven's ($F(1, 288) = 6.91, p = .009$). Therefore, gender and year in school were included as controls in all analyses reported next.

Results and Discussion

Interpretation of experienced difficulty and its relative frequency mattered. Analyses of covariance (ANCOVA) revealed a significant interaction between interpretation of experienced difficulty and relative frequency for time on task, $F(1, 284) = 4.22, p = .041$.²⁵ Time on task was higher for participants in the high frequency relative to others/difficulty as importance and the low frequency relative to others/difficulty as impossibility conditions who were led to believe they more frequently than others experienced difficulty as importance or less frequently than others experienced difficulty as impossibility. This pattern is shown graphically in Figure 14.

Follow-up analysis tested the prediction that investment of time would be greater if the frequency and interpretation conditions provided a sense that difficulty more frequently implies importance for oneself than for others and less frequently means impossibility for oneself than others ($M = 38.87, SE = 1.52$) compared to participants led to believe that they experienced difficulty as importance less than others or difficulty as impossibility more than others ($M = 34.57, SE = 1.58, F(1, 286) = 3.86, p = .051, d = .23$).

Time on task correlated with task performance (percentage of items correctly answered) at $r = .61, p < .01$. Performance was not a direct function of the condition assignment interaction

²⁵ There was no main effect of the relative frequency condition ($F(1, 284) = .06, p = .81$), and the interaction qualified the main effect of the interpretation of difficulty condition ($F(1, 284) = 4.28, p = .040$).

($F(1, 284) = .04, p = .84$). However, we predicted an indirect effect of condition on performance via time. Specifically, our prediction was that condition assignment would influence time on task and that time on task would influence performance. To test this prediction, we compared performance in the motivating conditions (in which participants were led to believe that they experienced difficulty as importance more than others or difficulty as impossibility less than others) to performance in the remaining conditions (in which participants were led to believe that they experienced difficulty as importance less than others or difficulty as impossibility more than others). Condition influenced time spent on the Raven's items (unstandardized $b = 4.301, t(3, 286) = 1.96, p = .051$) and time spent on the Raven's items predicted accuracy overall (unstandardized $b = .078, t(3, 286) = 12.74, p < .001$). Using the PROCESS computational tool to examine indirect simple mediation (Hayes, 2012), we found the posited indirect effect of condition on accuracy via time. The bootstrap confidence interval for the indirect effect (CI: .0025, .6908) did not contain zero, indicating mediation for the Raven's items. Increasing time spent on difficult tasks pays off in terms of better performance, and whether time is spent on difficult academic tasks is influenced by how students interpret their experienced difficulty relative to their peers.

GENERAL DISCUSSION

American college students want to succeed academically, but invest time disproportionately in non-academic endeavors (e. g., socializing) at the cost of pursuing academic success (e.g., Arum, Roksa, & Cho, 2011). Structural reasons for task disengagement, including stereotype threat (see Steele, 1997) and lack of economic resources (see Jackson, 2010; Orfield, Losen, Wald, & Swanson, 2004) are important but do not explain underinvestment in non-stigmatized and non-economically disadvantaged students. To understand this larger issue,

we turned our focus to examining how students interpret their experiences of difficulty in academic settings and the role of other students in these interpretations. In doing so, we synthesized social cognition (e.g., Bless & Schwarz, 2010) and identity-based motivation (Oyserman, 2007; 2009) approaches to predict how interpretation of feelings of difficulty would matter in the academic domain. We contrasted situations in which one's own experience is less frequent than others to situations in which one's own experience is more frequent than others while also manipulating interpretation of experienced difficulty. Experienced difficulty could be interpreted as implying that schoolwork is important and something one does, or that schoolwork is not worth one's time and not something one does. We predicted that students would believe that schoolwork was more identity-congruent, plan to devote more effort to school tasks, and actually spend more time on task if they believed that they interpreted experienced difficulty on school tasks as importance more frequently than others, or that they interpreted experienced difficulty on school tasks as impossibility less frequently than others.

To test our prediction, we assigned students to one of four conditions that manipulated both the interpretation of experienced difficulty in schoolwork and whether that interpretation seemed applicable for the self relative to others using high and low frequency scale manipulations (see Rothman, Haddock, and Schwarz, 2001). Thus, students were led to believe that their frequency of experiencing difficulty as implying that school was a 'me' or 'not me' thing was either relatively more or less frequent than it was for others. As predicted, students rated academics as more identity-congruent, planned to study more hours that night, and spent more time on a demanding cognitive task if led to believe that they interpreted difficulty as importance more often than others or difficulty as impossibility less often than others. Moreover, we also showed that time investment pays off in the form of better outcomes. Increased time

investment improved performance on a difficult set of problems where the temptation to quit was likely very high.

Our results highlight that students are sensitive to the experience of others in making sense of their own experiences as implied by social comparison theories (Festinger, 1957; Cialdini & Trost, 1998; Smith & Collins, 2009). Even one's own negative experiences can seem positive if they are seen as not as frequent as those of others, as illustrated by Schwarz (1999), who demonstrated that headache frequency led to less report of overall ill-health when patients were led to believe that they experienced fewer headaches than others. While prior research does highlight that task difficulty can increase investment up to a point (Brehm & Self, 1989; Silvestrini & Gendolla, 2013), this formulation does not consider that investment is also affected by the interpretation of experience in light of the experience of others.

Experience vs. Interpretation of Experience

Our findings are compatible with other research. Difficulty or failure at schoolwork can be demotivating, lowering efficacy (Bandura (1988; 1997) and reducing expectations of success (Atkinson, 1966; 1974; Eccles et al., 1983; Feather 1982). At the same time, success can also be demotivating, prompting students to shift their attention elsewhere (Carver & Scheier, 1990; Fishbach & Dhar, 2005) if success is interpreted as goal progress rather than commitment. What is new in the current studies is the approach we take to difficulty and motivation. First, we explicitly focus on interpretation of experienced difficulty rather than just experience more generally. Second we explicitly focus on the interplay between an interpretation of difficulty and relative social standing on that experience.

Experiences of difficulty can increase the identity-congruence of academics and investment of time on schoolwork if one is led to believe that one experiences difficulty as

implying impossibility less frequently than others or as implying importance (“no pain no gain”) more frequently than others. These results suggest that engagement with school tasks may still be a possibility if the difficulty one experiences is seen as indicative of goal commitment (see Fishbach & Dhar, 2005) and importance (see Oyserman, 2009) – the interpretation matters. Thus, regardless of past failures, interpreting experienced difficulty as importance could lead to more investment on a task, which can increase the chances of success. This approach is consistent with contemporary work that demonstrates interpretation of experience is enough to produce changes in behavior (e. g., Jamieson, Nock, & Mendes, 2013).

To demonstrate that the same interpretation can have different implications for the self depending on the relative frequency which one experiences it, we use the scale manipulation technique developed by Schwarz and colleagues (e.g., Rothman, Haddock, and Schwarz, 2001). The manipulation shifted responses on the dependent measures, implying that the judgment about what an interpretation of experienced difficulty means for one’s self is situated.

Combining “Why” (School-engagement is a ‘me’ thing) and “How” (Invest time)

We demonstrated that people experienced academics as more identity-congruent and planned to and did invest more time if their attention was drawn to a particular framing of experienced difficulty with schoolwork. These results complement a number of contemporary construal models of goal pursuit (e.g., Kruglanski et al., 2002; Trope & Liberman, 2003; Vallacher & Wegner, 1987). Of particular interest is the integration of our results with the predictions from action identification (Vallacher & Wegner, 1987) and temporal construal models (Trope & Liberman, 2003). Both models distinguish concrete, low-level construal (how to do it) from abstract, high-level construal (why do it). Action identification theory (Vallacher & Wegner, 1987) predicts that to take action, people need to shift from high-level “why” goals such

as doing well in school to lower-level “how” goals such as spending time on school work. Construal level theory (Trope & Liberman, 2003; Liberman & Trope, 2008) predicts that goals associated with high-level “why” construals are perceived to be more important than goals associated with low-level “how” construals. Goals construed at a high-level feel meaningful but are temporally distal, so students do not feel constrained in planning how they will actually attain them (Liberman & Trope, 1998), leading to both lack of preparation and overly optimistic estimates about the likelihood of distal goal attainment (the planning fallacy, Buehler, Griffin, & Peetz, 2010; Gilovich, Kerr, & Medvec, 1993; Kahneman & Tversky, 1979).

In our studies, the experience of academics as more identity-congruent can be seen as a “why” response, and planning to and investing more time a “how” response. Interestingly, our participants seemed to be both more “why” and more “how” engaged if they were made to believe that they experienced difficulty as importance more often than others or if they were made to believe that they experienced difficulty as impossibility less than others. When experiencing difficulty, IBM theory would predict that one needs both a “why” explanation (because it is identity-congruent) and a “how” explanation (by engaging in identity-congruent behaviors) in order to motivate action. Without a “why” explanation, one might know how to succeed but not see the importance of doing so for the self (this is not for me); without a “how” explanation, one might know why to work hard (this is for me) but the strategies to do so will not be readily apparent.

Future Research and Application

From an evolutionary perspective, it makes sense that people have mechanisms to encourage investing energy in pursuit of important goals as well as to trigger turning away from pursuit of impossible goals that are simply out of reach, not worth the time (Charnov, 1976;

Nesse, 2009). In the current studies, we focused on the first part, triggers that encourage investing energy. It is possible, though, that when a student sees a task as out of his or her reach because of experienced difficulty, it would be useful to goal switch; in that case, momentarily quitting on the goal at hand would allow one to focus on another goal (see Worsch, 2010). Rather than disengagement from academic goals entirely, students might use this method to reframe their focus on larger goals or different sub-goals. Of course the critical question is if goal switching involves switching from one goal to another that could also be considered means to attaining a larger academic goal or if the switch is to a goal that may stand in the way of school success (e. g., socializing). While the current studies were not aimed to answer this question, it is an important issue both theoretically and practically. Future work could address this issue, for example, by priming participants with both academic and social goals, providing relative standing feedback on both, and seeing how participants respond.

While experiencing difficulty is common, the idea of experiencing difficulty is an abstract notion and vaguely quantified. Students in our studies were unlikely to have come into the lab with a pre-identified count of how many times they had experienced difficulty in schoolwork over the past month. The same is likely to be true for other domains such as experiencing social difficulties. This likely strengthened our manipulation; our social comparison manipulation provided some anchoring information that students then used in their subsequent judgment (is schoolwork a ‘me’ thing?) and action (time investment).

For this reason, we see our studies as having applicability to everyday time investment. Take, for example, a student in a class experiencing difficulty. She is likely to ask herself why this is the case. One way for her to understand what her experience means is to look to others for information about how she should feel. If she interprets this experience as a sign of importance

and believes that others have this experience relatively less frequently than she does, she should feel energized since her interpretation of her own experience relative to others implies that school engagement is identity-congruent. Our results imply that students will be sensitive to such contextual cues of relative standing. Even something as prosaic as learning that test results are curved can matter. A curve implies that everyone experienced difficulty so raw scores cannot be used. The interpretation for those on the top of the curve is that they experienced difficulty as impossibility less frequently than others, implying that school engagement is identity-congruent. The interpretation for those at the bottom of the curve is that they experienced difficulty as impossibility more frequently than others, implying that school engagement may not be identity-congruent. As in our studies, these interpretations are consequential. Students at the bottom of the curve may invest less time studying for the next exam.

Conclusion

If experienced difficulty engaging in schoolwork is (mis)interpreted as signaling that school success is impossible, then school engagement feels less like a ‘me’ thing to do and attention shifts. Schoolwork is not worth one’s time. In contrast, framing difficulty as a signal that school success is important increases students sense that school engagement is a ‘me’ thing to do. Then students not only prioritize schoolwork, but also spend more time on difficult tasks, increasing the likelihood of success. Taken together, our results highlight that the interpretation of experienced difficulty matters for school outcomes. Academic engagement and ultimate success depends on how experienced difficulty is interpreted in light of the (presumed) interpretive experiences of others.

Low Frequency Relative to Others	High Frequency Relative to Others
≤ 10 times	1-2 times
11-15 times	3-4 times
16-20 times	5-6 times
21-25 times	7-8 times
26-30 times	9-10 times
≥ 31 times	≥ 11 times

Figure 11. Manipulating Relative Frequency with Low (Left Column, Experience Relatively Less Than Others) and High (Right Column, Experience Relatively More Than Others) Frequency Scales.

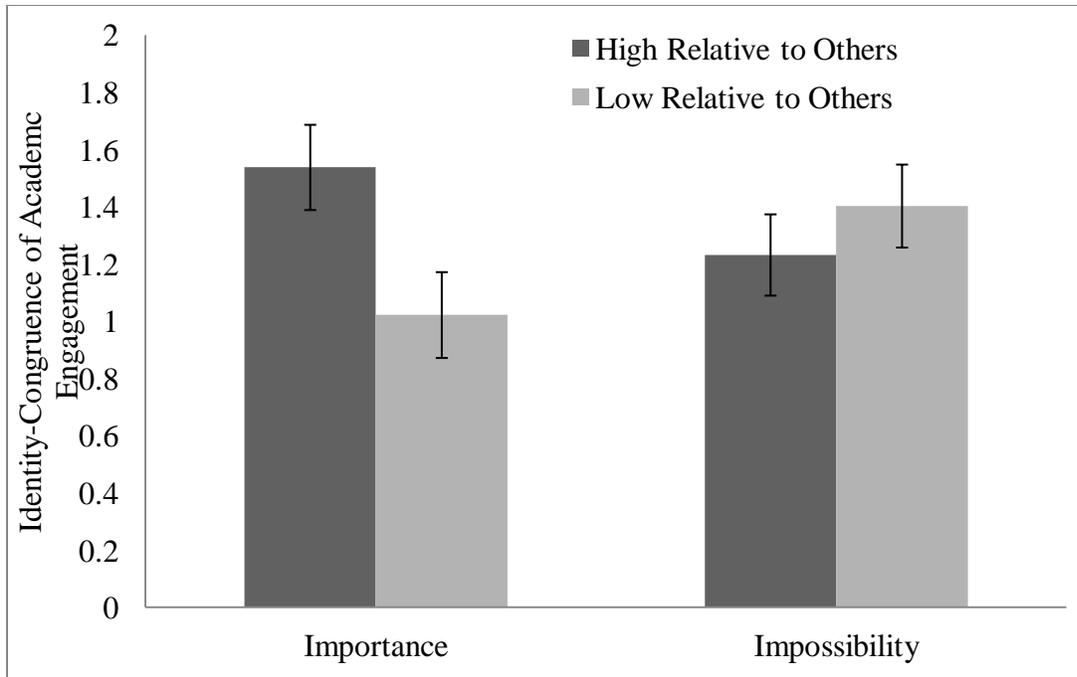


Figure 12. Study 1 Identity-Congruence of Academics: Graph depicts the predicted interaction between interpretation of experienced difficulty in schoolwork and frequency of interpretation relative to others (controlling for gender), $F(1, 94) = 5.38, p = .022$. Follow-up analysis showed that participants who interpreted experienced difficulty as importance relatively more than others or interpreted experienced difficulty as impossibility relatively less than others saw academics as identity-congruent ($F(1, 96) = 5.13, p = .026, d = .46$). Note: Experienced Importance of Academic is a mean of three standardized items.

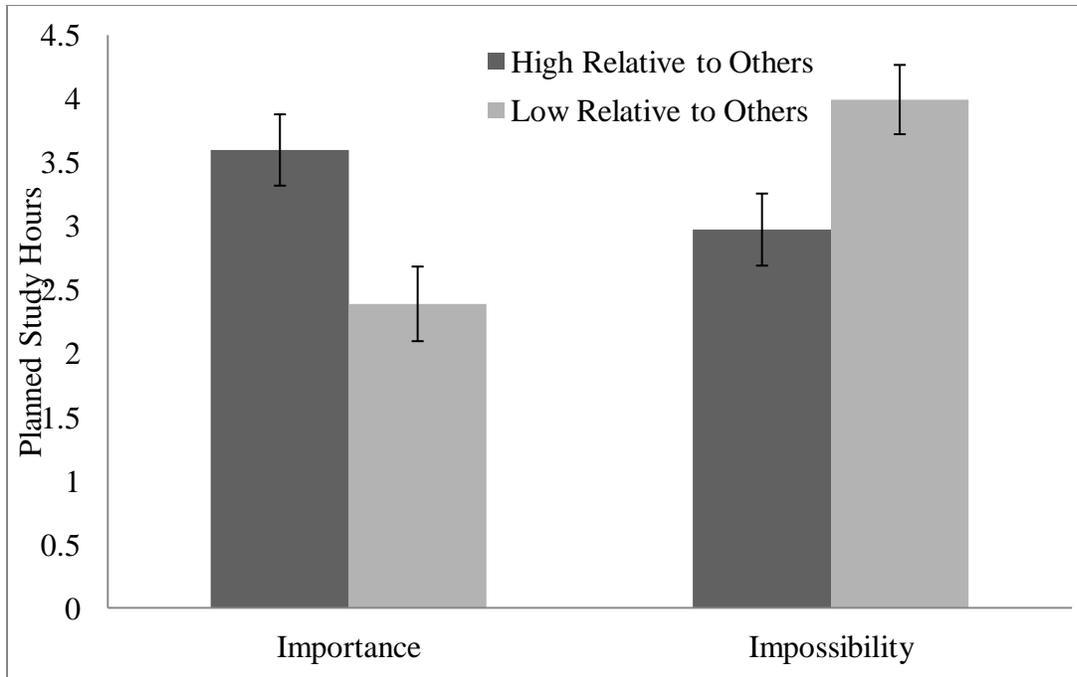


Figure 13. Study 1 Planned Study Hours: Graph depicts the predicted interaction between interpretation of experienced difficulty in schoolwork and frequency of interpretation relative to others (controlling for gender), $F(1, 93) = 15.15, p = .001$. Follow-up analysis showed that participants who interpreted experienced difficulty as importance relatively more than others or interpreted experienced difficulty as impossibility relatively less than others planned to study more hours ($F(1, 95) = 14.87, p < .001, d = .80$). Note: To obtain planned study hours we asked a single open-ended question.

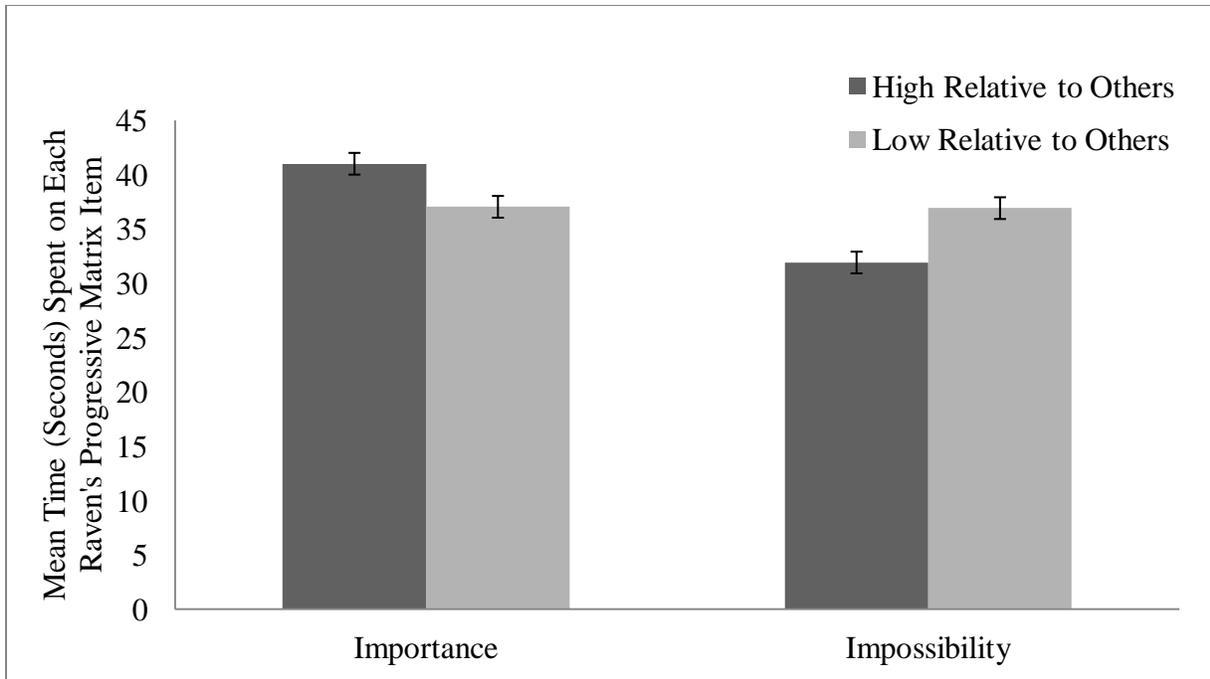


Figure 14. Study 2 Mean Time (Seconds) Spent on Each Raven's Progressive Matrix Item: Graph depicts the predicted interaction between interpretation of experienced difficulty in schoolwork and frequency of interpretation relative to others (controlling for gender and class standing), $F(1, 284) = 4.22, p = .041$. Follow-up analysis showed that participants who interpreted experienced difficulty as importance relatively more than others or interpreted experienced difficulty as impossibility relatively less than others spent more time on the difficult task ($F(1, 286) = 3.86, p = .051, d = .23$).

Chapter V

Discussion, Integrations, and Conclusions

In order to do well in school, students need to take action and engage effortfully. I began by noting that while students want to do well in school and achieve their academic selves and goals, they do not always take the necessary action that would make these selves and goals a reality. The lack of action does not stem from a lack of high aspirations or expectations for academic and career success – high aspirations and expectations are found across class and racial divides. Nor does it seem to stem from students working at such a high level that no more can be done. While there are variety of theories of motivation that emphasize the importance of factors such as expectancies and efficacy, the present studies focus on the motivational arousal that can be created by using contextual cues to reframe common experiences in motivating ways. Building on an identity-based motivation framework (Oyserman, 2007; 2009; in press), the current work focuses on cuing that now is the time to act to achieve important identities rather than waiting, and that once one does engage effortfully, difficulties along the way should be seen as cues of task importance and signals to keep going rather than cues of task impossibility and signals to stop.

In the first set of studies, I focused on how certainty and uncertainty could be an impetus for action and motivate students' behavior. Uncertainty should be motivating, enhancing the salience of one's goals and current goal-focused effort, if it focuses on the path while one's sense of their own capacities remains intact, which we term 'productive uncertainty'. Productive

uncertainty signals that one needs to get going (which one is capable of doing) since outcomes are not guaranteed and action will increase the likelihood of success. Study 1 disentangled self- and world-uncertainty by showing that while self-uncertainty decreases the number of salient academic and career-focused possible selves and strategies, world-uncertainty does not compared to a no prime control condition. In Study 2, students were randomly assigned to experience productive uncertainty (self-certainty combined with world-uncertainty) while other participants experienced a different combination of world- and self-(un)certainty. The salience of school and career-related possible selves and strategies to attain them and planned study hours were assessed, and both were significantly higher among participants in the productive uncertainty condition. The push for action makes those selves one wants to achieve more salient and more time is planned to take action to achieve them. Finally, Study 3 replicated Study 2 with a behavioral measure, working on one's resume versus playing online games. Again, students in the productive uncertainty condition were more likely to engage in action, working on one's resume, which will lead to the attainment of desired academic outcomes. Thus, inducing productive certainty helps serve as a push for action.

In the second set of studies, I examined the power of different framings of experienced difficulty in making academic and career-focused possible selves salient and motivating goal-focused action with low-income and minority middle school students. Instead of focusing on stable difficulty inherent to a task, a novel approach was taken by examining *interpretation* of difficulty, showing it is susceptible to situational cues. In Study 1, students accessed more academic and career-focused possible selves and strategies to attain them and created more solutions on a novel math task when given an interpretation of their experienced difficulty as a sign that school is important to them. In Study 2, students were given a framing of difficulty as a

sign of importance, impossibility, or no framing and worked on problems from Raven's Progressive Matrices. While there was no difference in performance between groups for easy problems, for difficult problems, students given a framing of difficulty as importance performed better. Finally, Study 3 replicated Study 2 using a writing task analogous to what students would do on state-wide standardized tests as the dependent measure. Remarkably, students presented with difficulty as importance manipulations actually wrote better essays as coded by independent raters than other students. Thus, the interpretation of difficulty matters in sustaining effort for low income and minority students.

The final set of studies built on the second set by showing that the relevance of an interpretation of difficulty is easily influenced by one's social context. In two studies, participants were asked about their own experience with a particular interpretation of difficulty while being exposed to biased scales that made their personal experience seem more or less frequent compared to others. Seeing one's experience as more frequent should lead to endorsement of that interpretation of difficulty and influence subsequent behavior; the opposite effect was predicted for seeing one's experience as less frequent. In Study 1, students told they experience difficulty as importance more than others, or difficulty as impossibility less than others, saw academic behaviors as more identity congruent and planned to study more hours that night. Participants in these same conditions in Study 2 worked more on a difficult task, Raven's Progressive Matrices Short form, by spending more time on the task rather than just giving up. Consequently, more time spent on the task indirectly predicted better performance. Thus, one's experience of difficulty is situated in a social context and influenced by others, and more effort pays off in the form of better performance.

Taken together, the results of these series of studies imply that students in school can be led to engage in action by making salient that now is the time to act rather than later and that difficulty need not be a signal to stop but to instead keep going on important goals. These effects are found through subtle framings and situational cues, demonstrating that these motivational process are dynamic and do not occur in a vacuum; instead, they are influenced by the environment and by others. Highlighting productive uncertainty and that one should see difficulty as a sign of importance can lead to action and increase the chances of academic success.

Our results build on the framework of identity-based motivation theory (IBM, Oyserman 2007; 2009; in press), which proposes that people prefer to act in identity-congruent ways, but that what identities come to mind in the moment and what they mean for action, or what behaviors are seen as identity-congruent, is dynamically constructed. Identities produce procedural and action readiness to behave in identity congruent ways. Moreover, when pursuing identity congruent goals, experienced difficulty can be interpreted as a sign of importance, leading to sustained effort and engagement, or a sign of impossibility, leading to decreased effort and disengagement. Productive uncertainty helps cue procedural and action readiness by making salient that now is the time to act. Manipulating interpretations of difficulty shows that how difficulty is understood matters for subsequent engagement and disengagement, as well as for what behaviors are seen as identity congruent and incongruent. One's interpretation of experienced difficulty is not static but influenced by the perceived experiences of others in comparison to the self.

Implications of results

These findings are encouraging in terms of their implications and applicability for a number of reasons. First, both experiences of difficulty and uncertainty carry with them negative connotations (preference is found for easy rather than difficult recall experiences and to-be-processed information, Schwarz, 2004; people desire to avoid ambiguities, i. e., need for closure, Webster & Kruglanski, 1994). For students in school, it is easy to see how these experiences could be associated with negative experiences. Experiencing difficulty on a test may imply that you do not know the material well enough and are at risk for failure; experiencing uncertainty about what will be on a test can also create worries about potential failure. If tasks are seen as impossible or failure is likely, disengagement from the schoolwork is a likely response. Yet our studies demonstrate that difficulty and uncertainty can be positive motivators. Likewise, other research also supports the motivating power of difficulty (see Brehm & Self, 1989; Silvestrini & Gendolla, 2013) and uncertainty (see Howard-Jones & Demetriou, 2009; Ozcelik, Cagiltay, & Ozcelik, 2013) as well. Uncertainty and difficulty are likely experiences that student have – and experiences that may lead to disengagement. By reframing how these experiences are interpreted (this difficulty doesn't mean that I cannot succeed but that I should work harder since its important, or I may not know what will be on the test, but I can study hard and prepare myself regardless), students may not only see the relevance of schoolwork but be more inclined to take and sustain action than they would be if they thought about these experiences in a different way.

Additionally, our results highlight the malleability of motivation. Without a doubt, there are many factors that go into student motivation. Social cognitive theory looks at the role of efficacy, which is informed largely by personal mastery experiences, the outcomes of others, and appraisals of experiences (Bandura, 1977). Likewise, expectancy value theories hinge on previous achievement experiences, gender roles and stereotypes, and self-schemas (see Wigfield

and Eccles, 2000). Student characteristics have been examined as well. Stereotype threat is the result of anxiety about confirming negative stereotypes about one's group (Steele, 1997). Black students, for example, are stereotyped as less intellectually capable based on the mere fact that they are black. Apprehension over confirming this stereotype for Black students who identify with doing well in school actually hurts test performance and the ability to succeed (for a review, see Schmader, 2010). As mentioned, low SES and disadvantaged neighborhoods can lead to worse academic outcomes (Entwisle, Alexander, & Olson, 2005; Huang, Guo, Kim, & Sherraden, 2010; Jackson, 2010). And there are a number of studies that highlight the influential role of parents and peers in students' engagement in school (Buttaro, Battle, Pastrana 2010; Davis-Kean, 2005; Davis-Kean & Sexton, 2005; Jodl, Michael, Malanchuk, Eccles, & Sameroff, 2001; Ryan, 2000; Seginer, 2009).

While these factors are important in understanding motivation, they are all arguably relatively stable factors (and some, such as race, are more stable than others, such as peer group). If these sorts of factors are all there is to motivation, we might never expect certain populations of students to engage in school. In other words, it is difficult (impossible) to change one's race or social class; past experiences are what they are and can only be modified with the addition of more experiences that differ in some way. Across the three sets of studies, there were likely students that could be placed along a continuum for a number of these factors – there were participants of different genders, races, SES backgrounds, with different family and peer experiences and histories of success and failures in school. Yet despite this array of factors, we were still able to motivate students across studies by using contextual cues that now was the time to act and continue acting regardless of obstacles. Even for students who may have gotten off track in college, if they got going now, success would be more likely. Even for students who may

live in neighborhoods where there are not salient examples of school success, difficulty can mean importance and effort can be sustained. The factors in motivation we addressed are not specific to a group or experience but should apply across these lines, and are malleable. It is even possible that in addition to the broad applicability of these manipulations, effects were stronger for groups who may ordinarily be more prone to failure (i. e., students of low SES, those with a history of failure, etc.). While our samples did not adequately allow tests of this last assumption (i. e., looking for interactions by race, for example), it is an interesting query for future research. But the take home message is that focusing on malleable rather than stable factors in motivation may effectively provide all students a chance to be successful, and may provide some students a much needed “second chance”.

Finally, our results highlight simplicity in implementation. While, for instance, helping parents learn how to better encourage their children toward academic success is a worthy cause, it is likely a very costly and labor intensive undertaking. Yet any student can be motivated to succeed academically in the moment by framing common experiences and the situation as scenarios where success is likely and action will get you there. For instance, having teachers stress to their students that certain material will be hard but that hard things are important is a simple way to implement some of our findings. The key moving forward is to focus on how simple contextual cues such as these can be implemented in classrooms over the long term.

Integration with the psychological literature

The series of studies presented and their implications are in line with a number of current psychological theories. In the following section, I detail the fit of IBM and our data with a few of those theories (though by no means is this an exhaustive list). To begin with, I focus on the crucial role interpretation of experience plays in informing judgment and behavior. Just as I

suggest that difficulty and uncertainty can be beneficial depending on how they are interpreted, recent research by Jamieson and colleagues suggests stress can be beneficial depending on how it is appraised (Jamieson, Mendes, & Nock, 2013). Jamieson et al. (2012) has participants reappraise the arousal they feel in stressful situations as a “resource that aids performance”, indicating a challenge, rather than threat. These participants subsequently have more positive outcomes than those who do not interpret their stress in this way, such as showing less negative physiological responses to stress (Jamieson et al., 2012) and performing better on quantitative GRE problems (Jamieson, Mendes, Blackstock, & Schmader, 2010). This line of research supports that how one interprets (appraises) their experience (difficulty, arousal) matters for performance, and that experiences that usually hurt outcomes can be reframed to help achieve positive outcomes.

Work on goal commitment and goal progress also details how focus on one explanation for behavior versus an alternative explanation can have important consequences for behavior. Fishbach and colleagues suggest the meaning one attributes to previous action, commitment or progress, matters (Fishbach, Zhang, Koo, 2009). Seeing action as an indication of commitment emphasizes the importance of a goal and the likelihood of attaining it. This process directs attention to goal-congruent actions and motivates one to continue pursuit of the goal. Progress emphasizes a reduction in the discrepancy between a current and desired state and highlights that one has “moved forward”. This process directs attention to balancing between goals and liberates one to act on goal-incongruent (i. e., other) pursuits. Both high commitment and low progress will encourage effort on a goal, whereas low commitment and high progress will encourage moving on to something else (Fishbach & Dhar, 2005; Fishbach, Zhang, Koo, 2009). Moreover, contextual cues that bring to mind superordinate goals influence action when progress is low and

commitment is high (Fishbach et al., 2006). Commitment clearly maps on to interpreting difficulty as a sign of importance, and both may result from similar underlying processes. It is possible (though not yet tested) that focusing on commitment helps motivate when difficulty is low; when difficulty is high, that specific experience must be addressed in order for effort to be maintained. Thus, difficulty as importance and commitment complement one another in motivating action. The link between difficulty as impossibility and progress is less clear. Seeing difficulty as a sign of impossibility may signal that no further progress can be made on a goal and it is time to focus attention on other pursuits, though progress seems to result from one moving closer to a goal and impossibility seems to result from one moving further away. Additionally, progress may signal that the goal is still within reach whereas it is doubtful that seeing difficulty as impossibility does. It would be interesting to see if students whose default response to difficulty is to stop do so because they see difficulty as a sign of progress or because they see difficulty as a sign of the unlikelihood of success as our studies seem to indicate.

This is not to say that progress is always harmful for motivation. Progress will likely encourage motivation since one is able to complete a task (after all, progress has been made). But it is unclear if progress is necessary for motivation, necessary but not sufficient, or sometimes not necessary at all. Expectancy-value theories would predict that students would engage when value is high even if expectancy is low, which signals little progress has been made or low progress is expected (Eccles, et al., 1983). The potential overlap between commitment and progress and IBM's interpretation of difficulty as importance or impossibility is intriguing and should be explored further. But again, both theories highlight the significance of the meaning people attribute to their experiences in determining subsequent choices and motivating action.

As discussed in the final set of studies, the integration of our results with predictions from action identification (Vallacher & Wegner, 1987) and temporal construal models (Trope & Liberman, 2003; Liberman & Trope, 2008) is particularly interesting. Both models distinguish between concrete, low-level construals (how to do it) and abstract, high-level construals (why to do it). While action identification theory (Vallacher & Wegner, 1987) predicts that thinking about goals in “how” terms leads to action, construal level theory sees thinking about goals in “why” terms as increasing the importance of a goal. Thinking about goals in higher level “why” frames leads to better self-control and more effective resistance of temptation (Fujita, Trope, Liberman, & Levin-Sagi, 2006). Thinking about higher level goals is also more likely to activate long term goals and cool, cognitive, and rational reactions rather than hot and impulsive reactions (see Kross & Mischel, 2010), which helps one to self-regulate and resist temptation. Yet this higher level approach may also lead to more lax planning and less focus on concrete action, as action identification theory points out. Indeed, as detailed in the Introduction, students in school who only think of the higher level goals of going to college and obtaining a successful career may not be able to make those aspirations a reality if they do not focus on the lower level strategies to get there. IBM may be able to help explain this apparent disconnect. A “how” explanation may help to get one moving; a “why” explanation may help to keep one engaged. In order to do well in school, students should be engaged, take action, and study (how), and when things become difficult, realizing that school goals are important ones (why) will help students to continue working hard. Strategies should be linked to a reason to act, particularly when outside obstacles send conflicting messages about the utility of effort.

Dweck and colleagues (Dweck, 1999; 2006; Blackwell, Trzesniewski, & Dweck, 2007) have suggested that one’s mindset about intelligence and learning matter for motivation.

Students (as well as teachers and administrators) can have a fixed mindset approach to intelligence, in which intelligence is seen a stable trait that one either possesses or not. When faced with failure, confidence, motivation, and subsequent performance all drop. Alternatively, those with growth or incremental mindsets see intelligence as a resource that can grow and develop and is built upon by effort and learning. Learning is the result of collaboration between students and teachers (rather than the sole responsibility of one party) and failure has little effect on performance and motivation other than signaling the need to switch strategies and try again. Inducing students to have an incremental versus fixed mindset has been shown to result in better academic performance (Blackwell, Trzesniewski, & Dweck, 2007) and counteract the effects of negative group stereotypes about performance (Good, Aronson, & Inzlicht, 2003). Dweck's mindset approach to motivation clearly has some overlap with identity-based motivation predictions about the interpretation of difficulty, but there are some distinctions as well. Most notably, interpreting difficulty as a sign of impossibility may map on closely to a fixed mindset. In both instances, a student may give up on a task because he/she does not believe they have what it takes to be successful. Indeed, in our studies there was a small correlation between these two constructs. The mechanisms underlying these effects might be closely related as well. A fixed mindset might lead a student to quit because they don't have the smarts to succeed, while a difficulty as impossibility interpretation leaves the underlying reason more open – one may not have the smarts, but this task may also not be something people like oneself do (potentially because people like them don't have the smarts, but also potentially because it is just not important to them), so there is no use in trying (Oyserman, Elmore, & Smith, 2012). Hence, identity should play a more important role with interpretations of difficulty than with mindsets.

The relationship is less clear with incremental mindsets and difficulty as importance. One could see a difficult task as important because they can develop the ability to do well, but it is a better probability that the task is seen as relevant to an important goal or identity rather than just something one can do (going back to the “why” of motivation in the earlier discussion). Furthermore, having one mindset or the other on intelligence should not exclude one from interpreting their experience of difficulty as a signal of importance or impossibility. Someone with a fixed intelligence mindset can still think “this is the type of task for me” even if it’s hard, while someone with a malleable intelligence mindset can still think “I could succeed, but this isn’t really a task for me”. Mindset manipulations seem to be more of an efficacy manipulation (can you learn or not), while interpretations of difficulty seem to be prescriptions for behavior (should you keep going or quit). Finally, experiencing difficulty might be a unique experience from having an incremental mindset. Difficulty implies that success is still possible as long as one keeps working and tries harder, while an incremental mindset implies more specifically that one should reevaluate the strategies used. If one does not have an alternative means to succeed, then one should quit.

At this point, many of the above ideas are yet to be tested. Ideally, a study in which incremental and fixed mindsets are activated followed by manipulations of interpretation of difficulty on a goal relevant task would be needed to help empirically disentangle the two theories, or something of that sort. Tests are needed that would show ways in which the two theories complement one another and contribute to the ultimate goal of student motivation and action. And again, Dweck’s work as do the current studies highlight the malleability of interpretations of experience through contextual cues and the subsequent impact on motivation.

Finally, two other theories are worth mention. First, mental contrasting (Gollwitzer & Oettingen, 2012; Kappes, Singmann, & Oettingen, 2012; Oettingen, 2000; Oettingen & Gollwitzer, 2009) involves initially imagining a desired future, which is then contrasted with present reality. This contrasting promotes goal pursuit by highlighting the desired future has not been fulfilled and one must take action to do so. For students in school, this process of contrasting the academic success they want to attain with the academic success they have attained could be useful for motivation. But, mental contrasting only motivates when expectations are high and goals are seen as feasible. Otherwise, mental contrasting demotivates action. This fits with our earlier discussion, for many students expectations may be high but the lack of concrete steps makes those goals unfeasible in reality. In fact, taken from a contrasting perspective, it is vital that students in low SES contexts have high aspirations despite their circumstances for any motivational processes to occur. Moreover, the experience of difficulty or of uncertainty in the moment can make success seem less likely, which should subsequently lower motivation according to a mental contrasting perspective. Thus, in this instance, mental contrasting would not be a useful method for increasing motivation and action. IBM instead focuses on reinterpreting that difficulty and uncertainty, proposing that while the gap between the future and current self is present, it can be closed. Even students with low expectations should be able to be motivated, which might in turn raise their expectations for success. In a similar way, implementation intentions (Gollwitzer & Oettingen, 2012; Gollwitzer & Oettingen, 2013) work best when commitment is high. Implementation intentions are if-then plans that link goal-directed responses to cues for action. Again, difficulty and uncertainty might initially signal that commitment to and investment in goals is low; these experiences must be reframed for motivation to occur.

Limitations and areas for future research

The role of identity. Central to identity-based motivation is the idea that motivational processes are rooted in important identities (Oyserman, 2007; 2009; in press). People are motivated to pursue behaviors that fit with current identities. Thus, salient identities provide the roadmap for what behaviors to engage in, how one should interact with the world, and how difficulty should be interpreted. Identity is the first step in the process. While the presented studies follow these premises, in actuality, the relationship between identity and behavior may have occurred in a direction not specified by IBM theory. Results could be seen to imply the reverse, that thinking about difficulty in a specific way or that thinking about un/certainty in a specific way led to the activation of the related academic and career focused identities. While IBM does not say that this reverse relationship is not possible, it is not the way the theory traditionally discusses it either. Thus, the relationship should be reciprocal. Certain identities fit with seeing experiences in a corresponding manner, but also, seeing a set of behaviors in a certain manner fits with certain identities. Why would one interpret experienced difficulty on a task as a sign of importance? It would be because things that are important to me typically fit with identities that I have. Playing basketball likely reminds one that being an athlete is an important identity they hold, just as thinking about one's self as an athlete makes one want to play basketball. In the same way, working hard on an academic task reminds you that being a college graduate is a desired identity you have, just as thinking about being a college graduate should make you want to work hard on an academic task.

The idea that identities need not be salient from the outset for motivational behaviors to occur is intriguing. One could argue that a limitation of some of our studies is that they do not have sufficient checks to see if identities are salient and more importantly if behaviors are seen

as identity-congruent. There is also no test to see if people engage in identity-incongruent behaviors after our manipulations. In other words, it is tested if interpretations of difficulty, for instance, lead to effort on a task conceptualized as identity-congruent, but there is no test to see if interpretations of difficulty have the same effect on tasks conceptualized as identity-incongruent. In particular, the second set of studies argues the strongest that effects are identity-based, but provides no evidence to date of the mediating role of identity. Instead, the latter proposition seems to be supported – that thinking about experienced difficulty as importance leads to the activation of academic identities. The undeniable question that follows is what is the actual role of identity? Is identity a necessary component for our results? Or is it the case that one could simply see difficulty as importance and act on that priming? At first glance, this is likely to be seen as an alternative explanation for much of our results. But, it is unlikely to be the full story since dependent variables also include measures that likely would not be the result of semantic priming, like the possible selves measures. There is a chance, though, that over time, certain behaviors and ways of thinking become non-consciously linked to one another. Hence, over time, one would not necessarily need to think of their identity to realize that an uncertain world would be a cue to get going, or that experiencing difficulty means one should work harder. And even if these interpretations can be situationally cued without the link to identity, having an identity link present, conscious or non-conscious, would likely strengthen effects by providing another cue or pathway through which the need for action can be signaled.

Regulatory focus theory. One area for further research is into the role people's regulatory focus plays in how they pursue goals. Regulatory focus (Higgins, 1997) breaks people down into those who are promotion focused and prevention focused. Promotion focused individuals are concerned with accomplishments and approaching gains while prevention

focused individuals are concerned with safety and security and avoiding losses (see also approach/avoidance motivations, Elliot & Church 1997). Promotion individuals are eager in goal pursuit; prevention individuals are vigilant (Crowe & Higgins, 1997). This distinction has an impact on the way in which goals are construed and pursued. Oyserman & James (2009) suggest that promotion and prevention focus matter for what kind of goal is best suited for a situation. While I have not said much about this distinction, possible selves and one's future identities can be thought of as those that one hopes to achieve (expected, hoped for, desired, or positive selves) and those that one hopes to avoid (to be avoided, feared, negative selves Oyserman & Markus, 1990). For those with a promotion focus, expected selves should be more salient; for those with a prevention focus, avoided selves should be more salient.

Taking into account students' contexts, those who grow up in a risky context (i. e., disadvantaged, low income) may be more inclined to have a prevention focus and be sensitive to avoided selves, since the risk of failure looms larger (see also Oyserman, Bybee, & Terry, 2006, for a discussion). Students in other contexts can likely be more promotion focused and sensitive to their desired selves. Empirical evidence supports this. Destin and Oyserman (2008) primed students to think of the college experience as success or failure prone, and then participants thought about either expected or feared possible selves. A match between focus and possible selves (failure prone and feared selves, success prone and expected selves) led to more planned time for studying than did a mismatch (failure prone and expected selves, success prone and feared selves). At the same time, balance (combination of feared and expected) may be just as important in maintaining motivation (i. e., approaching desired and avoiding feared selves, Oyerman & Markus, 1990; Oyserman, Bybee, & Terry 2006). Still, the role of self-regulatory focus and whether goals are presented in terms of approach or avoidance may be an interesting

moderator for future work to consider. Feeling uncertain about world processes may better fit with to be avoided selves and a prevention focus, as may interpretations of difficulty (since failure may be looming).

Affective experiences and self-esteem. Another potentially important factor to consider is the role of affect and self-esteem in motivation. Theories of self-esteem and affect in motivation abound. As an example, the affective responses associated with successes and difficulties inform the values associated with certain outcomes (Eccles et al., 1983; Weiner, 1985). Indeed, an important reason for achieving one's goals (other than reaping the attainment of a desired outcome) could be to feel good about one's self. Affect would seem to matter for motivation in two ways, by first letting one know how they are progressing on their goals and second, by bolstering the belief that one can achieve their goals (much like a self-efficacy conceptualization). For instance, cybernetic models of self-regulation (Carver, 2004; Carver & Scheier, 1990, Carver & Scheier, 1998) conceptualize positive and negative affect as signs that either one has done enough to reduce the discrepancy between the current and future self or one has not done enough, respectively. Hence, affect lets one know how one is proceeding on his/her goals and can be a signal of whether or not it is time to act.

Other research demonstrates that positive affect can facilitate motivation and goal pursuit (Kazen & Kuhl, 2005), in part by helping to increasing attentional focus on a goal when desire is high (Gable & Harmon-Jones, 2010). This fits with our uncertainty studies; self-certainty in particular (a component of productive uncertainty) seemed to consistently induce positivity in self-responses. Affect may be one mechanism through which other studies have found positive effects of being certain about the self in the past. Negative affect, on the other hand, has been shown to hinder goal pursuit (Tice, Bratslavsky, & Baumeister, 2001), though some negative

affect might actually be helpful for anticipating obstacles on more complex or ambiguous tasks (for example, Oettingen & Mayer, 2002). This suggests that negative affect might help on difficult tasks or on tasks experienced as negative. More research should be done on the interface of positive and negative emotions with experiences of difficulty and uncertainty.

The affective reaction of anxiety is especially interesting to consider in the discussion of motivation. Anxiety about performance can lead students to downplay the importance of certain academic tasks. Valuation of doing well in math is negatively related to anxiety in math (Eccles, 1984; Meece, Wigfield, & Eccles, 1990). If a student is worried about their math performance, one way to reduce that worry is to reduce investment in math and instead focus on other things. But like difficulty and uncertainty, anxiety is an experience that can be interpreted in more than one way. The experience of anxiety may be seen as a threat, which would decrease motivation, or it may seem like a challenge, which would increase motivation. This is similar to the conceptualization of the meaning of physiological reactions to tasks and situations (see Jamieson, Mendes, & Nock, 2013). The associated emotions that accompany challenge versus threat may also be important in motivation. Feelings of hope accompany a challenge, leading to less quitting and higher problem-focused coping potential (Smith & Kirby, 2009a). What may be more important than the emotion itself is the appraisal of what that emotion means for the self in the moment (see Smith & Kirby, 2009b). Again, interpretation of experience matters for subsequent action.

The positive link between self-efficacy and academic performance has been empirically established for decades (Wylie, 1979), with the idea that confidence in one's self allows one to perform better. More recent research suggests, though, that high self-esteem does not cause better school performance, but that the relationship may be instead caused by a third variable

(Baumeister, Campbell, Krueger, & Vohs, 2003; 2005). To this point, there is some work showing that it is unlikely solely boosting self-esteem will help performance, and may even have the opposite effect (Forsyth, Lawrence, Burnette, & Baumeister, 2007). Crocker and colleagues have focused on the role of contingencies of self-worth, or “what people believe they need to be or do to have value and worth as a person” (p. 200, Crocker & Knight, 2005). Someone with a contingency of self-worth in academics would be concerned with achieving success in that domain, which would motivate the behaviors he/she engages in and result in more time spent on academics. So, self-esteem and worth needs might motivate students to pursue their academic goals. Unfortunately, the pursuit of contingences of self-esteem comes at a cost. Disengagement from a task will result if the possibility of success is unclear or failure is imminent (Crocker & Park, 2004). So motivation could decrease if there is a possibility of negative outcomes, since failure will threaten self-esteem. For this reason people may be more motivated to pursue easy goals and avoid difficult ones that may be good opportunities to learn. Our studies seem to agree with these perspectives on self-esteem and worth; uncertainty about the self and abilities may not be a good way to motivate, but also just feeling certain about the self is not enough. Students may also quit on tasks they experience as difficult because they see it as impossible, but there might also be a self-threat component to this interpretation that makes disengagement more likely. An interesting hypothesis for future work is whether a difficulty as importance interpretation lessens the self-threat difficulty may seem to present to some students. The manipulation may help to remove the focus from the self to the task, allowing students to comfortably engage. Difficulty might be particularly self-threatening for those students for whom there are already doubts about their group’s performance; for them, reinterpretation of that experience might be most crucial.

Parental influences. To understand motivation for students, the role of parents cannot be overlooked. According to Eccles' socialization model (Eccles, 1993), positive interactions between parents and children around behaviors such as reading will lead to more reading and valuation of that behavior in the future. In this way parents are a significant influence for behaviors and their importance. Because children learn behaviors from observing others (Bandura, 1997), parents are important modeling agents since children often want to be like their parents (Eccles, 1993). For Black students in particular, parents may be key in the socialization process for achieving in White-dominated school systems (Buttaro, Battle, & Pastrana, 2010).

Parents are also an important influence for children's educational outcomes through expectations. Davis-Kean (2005) showed that how much schooling parents expected their child to complete had a direct (and indirect) influence on White students' achievement scores and an indirect influence on achievement scores for Black students. Parents' expectations for their children's success are positively related to years of education a student receives as well (Entwisle, Alexander, & Olson, 2005). Some research even suggests that having higher expectations may lead to more achievement related behaviors in the home (see Halle, Kurtz-Costes, & Mahoney, 1997). Furthermore, socioeconomic status and parents' education influences expectations which in turn influence student outcomes (Eccles, 1993; Davis-Kean, 2005), and those with more education and income tend to have more "realistic" expectations for their children's success, as measured by the correlation with students' actual performance (Alexander, Entwisle, & Bedinger, 1994). Similarly, Bandura's social cognitive model details an indirect causal pathway from SES to student's expectations via parents. SES influences parents' aspirations and ability to influence academic competency, which influences the academic self-efficacy of the child, which influences aspirations (Bandura, Barbaranelli, Caprara, & Pastorelli,

1996). Trusty (2000) found that mothers' expectations predicted stable (as opposed to lowered) student expectations over time for males and females, as did parental attendance at school activities. Trusty (1998) found similar effects for mothers' and fathers' expectations on students' expectations while in high school. For Black students in particular, attaining more than one aspired to was predicted by parent education and involvement with student homework, among other factors (Buttaro, Battle, & Pastrana, 2010).

Finally, among the issues that first-generation college students face, one may be a "culture shock" due to a general unfamiliarity about what to expect and how to successfully navigate college. The key conveyor of this knowledge is parents. For first-generation college students, their parents may not be able to as effectively help them in the transition to college because of a lack of knowledge on their part about what it takes (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). Indeed, in predicting the gap between educational aspirations and attainments, parental involvement proved to be a much better predictor for non-first generation college students than for first-generation college students (McCarron & Inkelas, 2006). Presumably, the parents of the first group had information to transfer which helped lessen the gap; the parents of the second group did not. Turning to the current work, parents might have an influence on student expectations and outcomes (among other reasons) because they act as salient models of how to deal with certainty, difficulty, and provide strategies for doing so. Parents can influence what to do when one faces difficulty and how to respond when outcomes feel uncertain, reinforcing what children think they should be doing, when they should keep going, when they should take action, etc. For example, co-reading with children can help them approach words they don't know (i. e., difficulty) by slowing down, sounding them out, and trying to figure them out. A child trying to read alone may come to an unfamiliar word and

simply skip over it, deciding it is not worth the effort or just not important for them to know. In this way, the present results potentially help to understand how and why parents can boost student achievement. It is also important to remember that parents, SES, and other factors discussed can have different effects at different points in students' educational career. Parents and SES may have less of an impact as students become older, and the transitions to middle school and again to high school can have important implications for motivation and achievement (for discussions, see Eccles, Lord, & Buchanan, 1996; Eccles & Roeser, 2005; Eccles, Roeser, Vida, Fredricks, & Wigfield, 2006; Oyserman, Bybee, & Terry, 2006). The presented studies did not focus on any one age group, but sampled from middle school students as well as college students. It may be wise to consider how these motivational processes and our manipulations look and function differently at different points in students' career trajectories.

Goal disengagement. As discussed, both a mechanism to engage and a mechanism to disengage are required for evolutionary success (Charnov, 1976; Nesse, 2009). The focus in the current set of studies was primarily on how to cue action for the engagement process rather than disengagement process. And if much of student underperformance can be attributed to a lack of action, this focus makes sense. While not considered in depth here, though, the disengagement process might be important to consider. Particularly, what do students focus on when they disengage? Is it another academic goal, or something that might hinder an academic goal, or something completely unrelated? There can be an adaptive quality to the disengagement process. Though giving up on a goal feels bad initially, it can be maladaptive to continually pursue a goal that is out of one's reach, and can lead to more severe negative affect. Again, I do not see the academic goals focused on currently as out of one's reach, but if they were, it would make sense to focus on something use. The upside to goal disengagement is that it allows one to refocus and

frees resources for another, potentially more realistic and productive goal (Gollwitzer & Oettingen, 2013; Wrosch, 2010). The hope would be that those “other” goals would not impede progress on academic ones. From our analyses of possible self-responses, it seems students tend to have multiple (and majority) academic and career focused selves. Because of a higher overall volume, it might be likely that disengagement on one academic goal leads to engagement on another one, though other goals, such as health, personality, and social goals, do exist as well. Future research is needed to shed light on what the disengagement process looks like for students in school.

A final limiting condition of this work is the actual feasibility of the goal. In all instances, I have conceptualized goals and identities as potentially difficult to achieve, but never truly unrealistic or impossible. Research suggests that the motivational impact of difficulty is non-existent for impossible tasks (Brehm & Self, 1989; Silvestrini & Gendolla, 2013). In this work cited, though, tasks truly were impossible to complete. We doubt that this is typically the case for students in school (and hope that it is not as well) – all students should have in their realm of possibility a college education and a good job, for instance. Nonetheless, the present work focuses on outcomes that are ultimately achievable. For outcomes that are truly not achievable, disengagement is obviously the best strategy. The problem for students in school has been conceptualized in this paper more as a motivational than feasibility issue.

Conclusion

An important caveat to mention is that in our studies, I do not claim to be making people smarter through our manipulations of difficulty and un/certainty. What I do claim is that by having students take action, good outcomes are likely to follow. But it should be noted that action only works to help improve outcomes if inaction is the default. Our synthesis of the

literature on the time students devote to schoolwork and several of our control conditions seem to support that this is the case – students are not acting by working on school tasks when they could and should. The implicit assumption is that the capacity to do more is there. I do not see the problem as one of efficacy; all students are assumed to have the ability to produce desired outcomes, but whether or not they act on that capacity is an entirely different matter. If all students were working at their maximum capacity, it is likely our manipulations would have much less of an effect. And while it means our studies may not show differences between groups, we hope this to be the case one day. But until then, it is important to remember that action does matter for outcomes. This introduces an interesting potential moderator of our effects. The less students are doing, the more our manipulations should help. For those who are very highly engaged, our work may be able to do little to help. This idea fits with other work; implementation intentions don't work when the subjects are perfectionists, because perfectionists are likely already doing everything in their power to effectively self-regulate. For the rest (majority) of students, our manipulations may be able to shift what the threshold for maximum effort is, allowing them to do more. I joyfully anticipate when research on motivation and helping students to achieve successful academic outcomes is no longer needed.

I opened with the assumption that in order to produce an outcome, one must take action. To achieve a goal, one's desired future self or identity, a possible identity, one should take action that makes that outcome more likely. Unfortunately, as a variety of statistics on the status of educational outcomes would have us believe, students often fail to do so. Thus, action is needed, and can be motivated by having students understand that now is the time to get going rather than later and that experienced difficulty is not a sign to stop, but a sign to increase effort and keep working. These messages can be cued by reframing experiences that students are likely to have,

those of uncertainty and difficulty, using simple contextual cues, whether inducing these ways of thought using prompts or comparisons with others. Across studies I showed that the way difficulty and uncertainty were interpreted mattered for the salience of school and career focused possible selves and strategies, planned time and planned action, and actual time spent, action, and choices. Whether or not one takes action is not just a function of past experiences, group membership, and expectations, but of motivational arousal and what context cues as the thing to do in the moment. Furthermore, I realize that our conceptualizations were one way, but not the only way, to motivate action, and discussed other relevant work, detailing and hypothesizing about when the different theories would make similar and dissimilar predictions and build upon one another. Our focus was on academics, but our findings likely have some transferability to any domain where action can increase the likelihood of achieving desirable outcomes, such as working on health goals. The take home message is that focusing on schoolwork, taking action, and putting forth effort even when things are difficult will increase student chances of success in school. The key is for students to just do it. And with the level of engagement as low as it is in some instances, students would likely benefit from just doing something.

Appendix A.

Self- and World-(Un)Certainty Primes.

Condition	Study 2 Prime	Study 3 Prime
Self-Certainty/ World-Certainty	<p><i>A just world and you can get ahead.</i></p> <p><i>Life is more predictable and controllable than people may think. The world usually operates according to meaningful rules and these rules are fundamentally fair. Further, it is often quite possible to learn and follow the rules needed to work toward goals in one's own life. Naturally, one often feels certain about the likelihood of achieving one's aims. Give an example of a goal you have and how the path to attain it is predictable and certain.</i></p>	<p><i>In many ways, the world is a very certain place. Moreover, one often feels quite certain about oneself.</i></p>
Self-Uncertainty/ World-Uncertainty	<p><i>A just world? Can you get ahead?</i></p> <p><i>Life is less predictable and controllable than people may think. The world does not usually follow meaningful rules and when it does, these rules are fundamentally unfair. Further, it is often difficult to learn and follow the rules needed to work toward goals in one's own life. Naturally, one often feels uncertain about the likelihood of achieving one's aims. Give an example of a goal you have and how the path to attain it is unpredictable and uncertain.</i></p>	<p><i>In many ways, the world is a very uncertain place. Moreover, one often feels quite uncertain about oneself.</i></p>
Self-Uncertainty/ World-Certainty	<p><i>A just world but can you get ahead?</i></p> <p><i>Life is both predictable and controllable and unpredictable and uncontrollable. The world usually operates according to meaningful rules and these rules are fundamentally fair. However, it is often difficult to learn and follow the rules needed to work toward goals in one's own life. Naturally, one often feels both certain and uncertain about likelihood of achieving one's aims. Give an example of a goal you have and how the path to attain it is in some ways predictable and certain and in other ways unpredictable and uncertain.</i></p>	<p><i>In many ways, the world is a very certain place. However, one often feels quite uncertain about oneself.</i></p>

<p>Self-Certainty/ World-Uncertainty (‘Productive Uncertainty’)</p>	<p><i>A just world? But you can get ahead.</i></p> <p><i>Life is both predictable and controllable and unpredictable and uncontrollable. The world does not usually operate according to meaningful rules and when it does, these rules are fundamentally unfair. However, it is often quite possible to learn and follow the rules needed to work toward goals in one’s own life. Naturally, one often feels both certain and uncertain about the likelihood of achieving one’s aims. Give an example of a goal you have and how the path to attain it is in some ways predictable and certain and in other ways unpredictable and uncertain.</i></p>	<p><i>In many ways, the world is a very uncertain place. However, one often feels quite certain about oneself.</i></p>
<p>Control</p>	<p>No prime</p>	<p><i>Today I ate breakfast.</i></p>

Appendix B. Interpretation of Difficulty

Priming Interpretation of Difficulty (Study 2c, Study 3)

Interpretation of Difficulty As Importance

1. When you find yourself working really hard on a school task, it's okay. That feeling just means it's important to you.
2. You can use your feelings about working on a school task to tell you how important it is for you. If you keep working even when it feels hard, it's probably important to you.
3. As a student, you know that difficult goals are the important ones. On those tasks, difficulty means that you should work harder.
4. Sometimes you have to work really hard in order to be successful at a school task, and there's nothing wrong with that. Having to work hard at a task means it is important.

Interpretation of Difficulty As Impossibility

1. When you're stuck on a school task, it is a sign that your effort is probably better spent elsewhere.
2. Sometimes, working on a school task feels very difficult – impossible really. That's okay because finding out that you are not likely to be successful can be helpful for moving on to other tasks.
3. Students shouldn't waste time on tasks that just aren't meant for them. If a task feels too hard, then you should move on to something else so that you can succeed in something else.
4. As a student, you know that when working on a school task feels hard, that feeling means that it might just not be for you.

Measuring Interpretation of Difficulty (Study 2c)

Interpretation of Difficulty as Importance ($\alpha = .73$)

1. When you find yourself working really hard on a school task, that effort means it's important to you.
2. As a student, struggling to complete a task makes you increase your effort and try even harder.
3. A good rule to follow as a student is “if it feels hard, it is important.” Really important goals involve difficult tasks along the way.
4. Sometimes you have to work really hard in order to be successful at a school task, but that doesn't make it an impossible goal.

Interpretation of Difficulty as Impossibility ($\alpha = .56$)

1. When you're stuck on a task for a particular class in school, it is a sign that your effort is better spent elsewhere.
2. If working on a school task feels very difficult, that type of task may not be possible for you as a student.
3. Sometimes students work at tasks that just aren't meant for them. If a task feels too hard, you should move on to something else.
4. As a student, you know that if working on a school task feels hard, that means it's not for you.

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