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Assessing Interpretations of Experienced Ease and Difficulty as Motivational Constructs

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Are people motivated by ease and sapped by difficulty, or the reverse, does ease undermine motivation while difficulty bolsters it? Following identity-based motivation theory, whether ease or difficulty bolsters or undermines motivation depends on which lay theory of ease or difficulty is accessible in the moment. Experienced ease can imply that something is "possible for me" in part because the odds of success are high, or that something is "not worth my time" in part because the task is of low value. Experienced difficulty can imply that something is "important for me" as the task is valued, or that something is "impossible for me" as odds of success are low for "me" or "us." We developed ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility measures to assess individual differences in endorsement of these lay theories ($N = 963$). We tested ($N = 200$) convergent and discriminant validity with other measures of motivation: self-efficacy, locus of control, growth, grit, mental toughness, prevention and promotion regulatory focus, and construal level. We documented predictive validity by showing that performance on a cognitive reasoning task correlates with ease-as-possibility, ease-as-triviality, and difficulty-as-impossibility ($N = 183$). Ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility supplement other measures of motivation, yielding new insight into motivational processes. These measures can be used in addition to other tools, including priming and implicit assessment.

Keywords: identity-based motivation, metacognition, self-regulation, self-control, mindsets

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Everyday life, indeed, almost anything a person does, can feel easy or difficult; people may or may not infer something from these feelings, but often do. At the same time, since life's course is uncertain and people cannot fully know their capacities at each juncture along the way, what a particular experience of ease or difficulty implies for who one is now and for who one might become in the future is not certain. Experienced ease might signify that succeeding at a task is likely and possible, a "me" thing to do, or that though possible, it is trivial and hence "not worth my time, not for me." Experienced difficulty might signify low odds of success, that succeeding at a task is impossible for me and hence "just not worth my time" or that no matter the odds, the task is an important and valued one, "no pain, no gain" and hence a me thing to do. Identity-based motivation theory predicts that people's attributions about what experienced ease and difficulty imply are a function of which identities come to mind and what these identities seem to imply in context for action and meaning-making (Oyserman, 2007, 2009). Task-related motivation could be bolstered or undermined as a consequence of either ease or difficulty depending on

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whether an odds (possible for me, impossible for me) or a value (important for me, trivial for me) attribution is brought to bear in making sense of one's experience. Yet, without measures of these attributions of ease (ease-as-possibility, ease-as-triviality) and difficulty (difficulty-as-importance, difficulty-as-impossibility), it is not possible to know how these lay theories relate to other measures of motivation.

In the current studies, we address this gap in three steps. First, we develop measures of lay theories of what experienced ease and difficulty imply. Then we demonstrate convergent and discriminant validity with other measures of motivation and, finally, we turn to predictive validity. We show that how much each lay theory of ease and difficulty is endorsed significantly correlates with performance on a cognitive task requiring noticing that rule-based, systematic reasoning is required.

Metacognition and Identity-Based Motivation

A lay theories formulation implies that thinking involves both content (what is on one's mind) and interpretation of metacognitive experience (the meaning attributed to experienced ease and difficulty while thinking). A large body of work demonstrates that people make inferences based on their metacognitive experiences unless given reason not to, even if they could draw on otherwise relevant content (for reviews, see Oppenheimer, 2008; Schwarz, 2015). The lay theories that people hold, whether chronically or momentarily activated by situational cues, influence how metacognitive experience is interpreted (Oppenheimer, 2008; Reber & Schwarz, 1999; Reber, Winkielman, & Schwarz, 1998; Rhodes, 2006; Schwarz, 2015). These lay theories often do not feel like theories at all, but rather like spontaneous natural observations of reality itself (sometimes termed naïve realism: Griffin & Ross, 1991). Identity-based motivation theory provides a theoretical framework for how this works in the domain of identity, predicting that people are motivated to act and interpret their experiences in ways that feel congruent with their identities (Oyserman, 2007). At the same time, which identities come to mind and what these identities are taken to mean and imply for behavior and interpretation of experience is dynamically constructed in the moment (Oyserman, 2015).

Experienced difficulty can imply that one's odds of success are low, with experienced difficulty implying impossibility: "*I* don't know this (or cannot learn it), this is not for me." This lay theory seems common. For example, presumably because they cannot shake their lay theory of experienced difficulty as implying "not for me," people are not motivated to use learning strategies they experience as difficult even when shown that these difficult strategies are more effective for learning (Karpicke, Butler, & Roediger, 2009; Kornell & Bjork, 2008; Yan, Bjork, & Bjork, 2016). Experienced difficulty can also imply that one values the task, with experienced difficulty implying importance: "*I* really care about this, 'no pain, no gain,' this is for me." This interpretation is less common, as shown in an analysis of word usage in the English-language (Yan & Oyserman, 2017). However, students can be easily guided to adopt this lay theory, reporting more centrality of academics in their current self-concept (Smith & Oyserman, 2015) and their future possible selves (Aelenei, Lewis, & Oyserman, 2017) after being led to consider that difficulty means importance. The opposite is also true: guiding students to imagine their academic future selves increases their endorsement of a difficulty-as-importance lay theory (Oyserman, Destin, & Novin, 2015).

It is not just one's interpretation of experienced difficulty that matters; interpretation of experienced ease matters as well. Experienced ease can imply something about one's high odds of success, with experienced ease implying possibility: "*I* know this (or can know it), *I* am (or can become) good at this." Indeed, the large body of work on judgments of learning suggests that when people experience ease, they typically infer that they know the material or are doing well on a test or exam (for a review, see Bjork, Dunlosky, & Kornell, 2013). At the same time, experienced ease can also imply something about value: easy tasks may be of low value and interpreted as trivial, just not worth one's time, even if one is likely to be successful at them: "*I* should not waste my time on this stuff, it is beneath me." For example, gifted students are at risk of disengaging and underperforming if they interpret their experienced ease in learning as implying that schoolwork is so easy as to be

trivial and not worth their time (Kanevsky & Keighley, 2003).

However, the evidence that lay theories of what ease and difficulty imply for oneself matter for motivation is mostly indirect because lay theories themselves are not directly assessed. Instead, researchers have used two indirect routes. One route is to induce an experience of ease or difficulty on an unrelated task and show that this carries over to judgments about identity (e.g., Oyserman, 2007; Oyserman, Fryberg, & Yoder, 2007). The other route is to make a specific lay theory of what ease or difficulty implies momentarily accessible and document change in identity and task-related motivation (e.g., Elmore, Oyserman, Smith, & Novin, 2016; Lewis & Earl, in press; Smith & Oyserman, 2015).

Consider first studies that induce an unrelated experience of ease or difficulty and test downstream consequences for identity. For example, in one study, adults rated themselves as more invested in politics after being given easy-to-answer rather than difficult-to-answer political knowledge questions (Schwarz & Schuman, 1997). In another study, participants rated healthy living strategies as more likely to improve their own longevity after being given an easy-to-answer rather than a difficult-to-answer unrelated question about their racial-ethnic group (Oyserman et al., 2007). Those induced to experience difficulty on the preceding unrelated question rated strategies for healthy living as less effective than those who were not induced to experience difficulty. This main effect was moderated by beliefs about in-group identity. Though all participants in the difficult condition rated the question as difficult, subsequent judgment of the effectiveness of strategies for healthy living for one's own longevity was only undermined among participants who believed that their in group did not engage in healthy habits (Oyserman et al., 2007). The results of these studies suggest that participants take their experience of ease or difficulty in answering a prior unrelated question and use their interpretation of their ease or difficulty (based on the lay theory they apply) in making subsequent judgments about themselves. Though which lay theory is being used is not assessed, results imply that accessible lay theories link task to identity. The problem here is that the author is making an inference about the lay theory participants are using and whether or not the inference is correct is not testable.

This particular limitation is addressed in the other indirect route linking identity and lay theories of ease and difficulty, which is making a specific lay theory accessible and documenting its consequences for identity and motivation (e.g., Elmore et al., 2016; Lewis & Earl, in press; Smith & Oyserman, 2015). This is done by having participants read and rate their agreement or disagreement with a biased scale, one that presents only the notion that experienced difficulty implies impossibility or only the notion that experienced difficulty implies task importance. The effect of bringing the lay theory to mind on subsequent identity and task-related motivation is tested by comparing identity, motivation, and performance across participants randomized to be exposed to one or another of the lay theories. For example, in one set of studies, compared with college students guided to use a lay theory that difficulty implies impossibility, college students guided to use a lay theory that difficulty implies importance were significantly more likely to describe academics as central to their current identity and performed better on a standardized intelligence test (Smith & Oyserman, 2015). This effect on performance was replicated with middle school students (Elmore et al., 2016). Similarly, Lewis and Earl (in press) showed that dieters guided to use a lay theory that difficulty implies importance felt significantly less tempted to continue snacking compared with dieters guided to use a lay theory that difficulty implies impossibility. Though clear as to which lay theory is on the mind, these studies do not address the question of how much each is endorsed or how they relate to one another.

In spite of these limitations, the results of these studies show the consequences of lay theories. These results are important because they demonstrate that an upstream experience of ease or difficulty can have downstream consequences on ostensibly separate downstream judgments. Moreover, results show that it is not the ease or difficulty itself, but what that ease or difficulty is taken to mean that matters. Some lay theories yield an estimate of the odds of success (difficulty-as-impossibility, ease-as-possibility), other lay theories yield an estimate of the value of success (difficulty-as-importance, ease-as-triviality).

As detailed next, there are a number of ways in which our lay theories focus is distinct from the focus of expectancy-value theory (e.g., Atkinson, 1964; Wigfield & Eccles, 2000). First, expectancy-value theory focuses on how objective features of task difficulty translate into an expectation of success (Atkinson, 1964; Brehm & Self, 1989). In contrast, our lay theories framework focuses instead on interpretation of subjective experience. Results of studies such as the ones we summarize above show that sometimes task-related motivation is based on interpretation of a metacognitive experience of ease or difficulty that is not related to the task but is carried over and used as input as to the value or odds of the task itself. Second, expectancy-value theory operationalizes motivation as a product of expectancy and value with highest motivation when odds (expectations of success) and value are high (Atkinson, 1964; Wigfield & Eccles, 2000). In contrast, our lay theories framework focuses on the impact of odds and value separately with the implication that motivation is not always a result of the product of Expectancy × Value. Our lay theories framework also predicts that motivation (high or low) is based on (high or low) odds sometimes and at other times on (high or low) value. Thus, ease-as-possibility focuses on odds, difficulty-as-importance focuses on values, yet both are motivating lay theories. At the same time, ease-as-triviality focuses on value and difficulty-as-impossibility focuses on odds and both are demotivating. Hence motivation can be the result of productive (motivating) or unproductive (demotivating) lay theories of what experienced ease and difficulty implies. Motivational consequences do not require that ease and difficulty be objective features of the task or that a product of expectancy and value be obtained.[1]

Motivation, Motivational Style, and Identity-Based Motivation

A few studies directly measure endorsement of the lay theory that experienced difficulty signals task importance and the lay theory that experienced difficulty signals task impossibility (Aelenei et al., 2017; Oyserman, Novin, Elmore, & Smith, 2017). In these studies, how much people endorse one lay theory is not very correlated with how much they endorse another, implying that each is a separate lay theory rather than being two sides of a single theory. Moreover, these studies find that on average, people agree with the difficulty-as-importance lay theory and disagree with the difficulty-as-impossibility lay theory. There is also some indication that low place in social hierarchy (e.g., minority status, low education) is associated with less endorsement of the difficulty-as-importance lay theory that experienced difficulty implies task importance (Aelenei et al., 2017).

However, the broader question of how lay theories relate to other measures of motivation and motivational style and whether assessed lay theories yield the same pattern of effects as priming studies has not yet been addressed. To make the task more manageable, in the current study we parsed measures of motivation and motivational style to three groups, which we termed measures of "motivation as experienced control," measures of "motivation as resilient character," and measures of "motivation as goal formulation." Below we articulate our predictions about the relationship between measures in each group and lay theories of experienced ease and difficulty. For clarity, we first describe the measures we clustered in each group and prior research showing predictive, convergent, and discriminant validity (intercorrelations) of measures of each group. To interpret correlations, we used three rules of thumb: Cohen's (1988) correlational size rule of thumb (.1 = small, .3 = moderate, .5 = large), Campbell and Fiske's (1959) convergent validity rule of thumb (correlations significantly different from zero), and Kline's (2011) discriminant validity

[1] For different reasons, Brehms' motivational intensity (e.g., Brehm & Self, 1989) and Higgins' regulatory focus (e.g., Higgins & Cornwell, 2016) also make this point. Brehms' motivational intensity theory predicts and shows that lowering odds of success, as operationalized by increasing difficulty, increases rather than decreases motivation up to the point that the task becomes impossible or that effort is no longer justified (e.g., Brehm & Self, 1989; Richter et al., 2016). Higgins' regulatory focus theory predicts and shows that sometimes low odds are irrelevant to motivation—when one is obligated to act (ought self-focus) or is focused on preventing failures (prevention focus), then motivation is not undermined by low odds of success (e.g., Higgins & Cornwell, 2016; Scholer et al., 2010).

rule of thumb (correlations below .85). In each case, cutoff refers to absolute value of a correlation (e.g., it could be positive or negative). For ease of recall, we also briefly summarize the predicted strength and direction of relationship between of our four lay theories of experience and each of the other measures of motivation in Table 1.

Measures of Motivation as Experienced Control (Self-Efficacy and Locus of Control)

Implicit in the idea of motivation is the notion that one could succeed if one tries enough and, in that sense, that desired outcomes are within one's control—that if one tries, then one can succeed. This idea is central to the concepts of self-efficacy (Bandura, 2006, 2012) and internal locus of control (Rotter, 1966). Empirically, efficacy and locus of control are distinct but highly associated (in meta-analyses, $r = .56$; Judge, Erez, Bono, & Thoresen, 2002). Theoretically, both should be associated with more persistent task engagement since both focus on the likelihood of success given engagement. Evidence supports this prediction in the domains of work and school: work self-efficacy (Alessandri, Borgogni, Schaufeli, Caprara, & Consiglio, 2015), school self-efficacy (Bouffard-Bouchard, Parent, & Larivee, 1991; Komarraju & Nadler, 2013), and locus of control (Judge & Bono, 2001) are each associated with better outcomes.

We draw on the joint definition of efficacy and locus of control as one's belief that one has what it takes to attain an outcome (Bandura, 2006; Rotter, 1966), to make the following straightforward predictions about the relationship with lay theories of ease and difficulty. We predict that efficacy and locus of control will be positively associated with motivation-increasing lay theory scores (difficulty-as-importance, ease-as-possibility) and negatively associated with motivation-undermining lay theory scores (difficulty-as-impossibility, ease-as-triviality). In terms of the strength of these associations, we predict weak associations with difficulty-as-importance and ease-as-triviality and moderate associations with difficulty-as-impossibility and ease-as-possibility lay theories. Our rationale is that efficacy and locus of control do not necessarily imply anything about the value of a task, and would therefore be weakly related to these lay theories (difficulty-as-importance, ease-as-triviality). However, lay theories that emphasize the odds of success (difficulty-as-impossibility, ease-as-possibility) would be moderately related to belief that if one tries one could succeed, as this implies high odds of success.

Motivation as Resilient Character (Growth, Grit, Mental Toughness)

Just as self-efficacy and internal locus of control focus on one's ability to change one's outcomes if one tries, growth mindset focuses on the belief that abilities can change as a result of effort (e.g., Chiu, Hong, & Dweck, 1997; Dweck, 2000; Dweck, Chiu, & Hong, 1995; Job, Dweck, & Walton, 2010). While grit (Credé, Tynan, & Harms, 2016; Duckworth, Peterson, Matthews, & Kelly, 2007) and mental

Table 1
Predicted Associations Between Lay Theories of Experience and Other Motivational Constructs

Motivational Construct	Difficulty-as-importance	Difficulty-as-impossibility	Ease-as-possibility	Difficulty-as-triviality
Efficacy, locus of control	Pos.	**Neg.**	**Pos.**	**Neg.**
Growth mindset	Pos.	**Neg.**	Pos.	Neg.
Grit, mental toughness	Pos.	**Neg.**	Pos.	**Neg.**
Promotion focus	Pos.	Neg.	**Pos.**	**Neg.**
Prevention focus	Pos.	**Neg.**	Pos.	**Neg.**
Construal level[a]	**Pos.**	**Neg.**	**Neg.**	**Pos.**

Note. Direction of association is represented by "Pos." for positive and "Neg." for negative associations. Magnitude of association is represented by light or bold type. Lightface type represents small predicted magnitude; boldface type represents moderate predicted magnitude. We use Cohen's (1988) rules of thumb quantify predicted weak ($r < .1$; Pos., Neg.), moderate ($r < .3$; **Pos.**, **Neg.**). Note that we predict no large associations between our lay theories and other motivational constructs.

[a] Construal level is represented such that lower values are concrete and larger values are abstract, such that a positive association implies that high lay theory scores would be associated with a more abstract construal.

toughness (Andrews & Chen, 2014; Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015; Mahoney, Gucciardi, Ntoumanis, & Mallett, 2014) focus on ability to stick with a goal. Theoretically as well as empirically, grit, mental toughness, and growth mindset are associated but distinct constructs. Grit and mental toughness are moderately positively correlated, $r = .46$ (Credé et al., 2016); correlations between grit and growth vary from small to medium sized ($r = .18$, West et al., 2016; $r = .16$, Yeager et al., 2016; $r = .35$, Myers, Wang, Black, Bugescu, & Hoeft, 2016). Each is associated with better goal-focused attainment (e.g., grit: Duckworth & Gross, 2014; Eskreis-Winkler, Schulman, Beal, & Duckworth, 2014; mental toughness: Gucciardi et al., 2015; Nicholls, Polman, Levy, & Backhouse, 2008; growth mindset: Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Dweck, 2000; Job et al., 2010).

We draw on the definition of growth mindsets as belief that one is able to change (Dweck, 2000) to make the following straightforward predictions about the relationships with lay theories of ease and difficulty. We predict that growth mindsets will be positively associated with motivation-increasing lay theory scores (difficulty-as-importance, ease-as-possibility) and negatively associated with motivation-undermining lay theory scores (difficulty-as-impossibility, ease-as-triviality). With regard to strength of associations, we predict weak associations with difficulty-as-importance, ease-as-possibility, and ease-as-triviality and a moderate association with difficulty-as-impossibility. Our rationale is that growth mindset does not address ease or difficulty explicitly, therefore most associations will be weak with the exception of a moderate predicted relationship between growth and difficulty-as-impossibility scores. We predict a moderate correlation in this case because difficulty-as-impossibility implies that one should disengage in response to difficulty, which is incongruent with the growth mindset belief that one can change and overcome difficulty.

We draw on the definition of grit and mental toughness as valuing stick-to-itiveness and sustained effort toward goals (Duckworth et al., 2007; Gucciardi et al., 2015) to make the following straightforward predictions about the relationships with lay theories of ease and difficulty. We predict that grit and mental toughness will be weakly positively associated with motivation-bolstering lay theory scores (difficulty-as-importance, ease-as-possibility) and moderately negatively associated with motivation-undermining lay theories scores (difficulty-as-impossibility, ease-as-triviality). Regarding strength of associations, our rationale for predicting a weak association is that grit and mental toughness focus on stick-to-itiveness, which does not necessarily mean that difficulty would imply importance or that ease would imply possibility. Our rationale for predicting that any association no matter if weak will be positive is that higher scores on each of these constructs are associated with positive outcomes. Hence, any relationship that is found would likely be positive. With regard to our prediction of a moderate association between difficulty-as-impossibility, ease-as-triviality lay theories and measures of grit or mental toughness, the latter scores operationalize valuing stick-to-itiveness, which implies that one should persevere toward goals, even when they feel difficult or are trivial. This is incongruent with difficulty-as-impossibility and ease-as-triviality lay theories and would therefore suggest a moderate negative relationship.

Motivation as Goal Formulation (Regulatory Focus and Construal Level)

Rather than focus on ability to make change and sustain effort, regulatory focus (Higgins, 1998) and construal-level (Trope & Liberman, 2010) theories examine the relationship between motivation and how goals are formulated. Regulatory focus includes promotion-focus—motivation to move eagerly toward successes, and prevention-focus—motivation to vigilantly avoid failures (Freitas, Liberman, Salovey, & Higgins, 2002; Lanaj, Chang, & Johnson, 2012). Which regulatory focus works better depends on the situation; prevention-focused participants start taking action sooner and are better able to attain goals if avoiding temptations is necessary (Freitas et al., 2002). In contrast, promotion-focused participants are better able to attain goals if distractions are not present (Freitas, Salovey, & Liberman, 2001). Construal level theory distinguishes behaviors instantiated abstractly in terms of the value of the outcome (e.g., studying as learning the material) from behaviors instantiated concretely in terms of the specific steps (e.g., studying as taking notes)

involved to attain an outcome (Trope & Liberman, 2003). Research has shown that both abstract and concrete construal can improve motivation and performance; a concrete construal is more effective for simpler tasks and an abstract construal is more effective for more complex tasks or those that involve task switching (Freund & Hennecke, 2015; Schmeichel, Vohs, & Duke, 2011). Empirically regulatory focus and construal level are linked; motivation increases when abstract construal is paired with promotion-framing and when concrete construal is paired with prevention-framing (Lee, Keller, & Sternthal, 2010; White, Macdonnell, & Dahl, 2011). In terms of measures, we did not find published studies correlating construal-level and regulatory focus scores, and the extent that promotion and prevention scores correlate depends on the actual measures used (Haws, Dholakia, & Bearden, 2010; meta-analytic r = .08; Lanaj et al., 2012).

We draw on the definition of promotion focus as motivation to move eagerly toward successes (Higgins, 1998) to make the following straightforward predictions about the relationships with lay theories of ease and difficulty. We predict that promotion focus will be positively associated with motivation-increasing lay theory scores (difficulty-as-importance, ease-as-possibility) and negatively associated with motivation-undermining lay theories scores (difficulty-as-impossibility, ease-as-triviality). With regard to strength of association, we predict weak associations with lay theories of difficulty and moderate associations with lay theories of ease. Our rationale is that promotion focus does not address experienced difficulty, hence we predict weak associations with lay theories of experienced difficulty. We expect moderate associations between promotion focus and lay theories of experienced ease as detailed next. We predict a positive association between promotion focus and ease-as-possibility since eagerness to attain success (promotion) and increased engagement after experiencing ease (ease-as-possibility) both should encourage engagement. We predict a negative association between promotion focus and ease-as-triviality since eagerness to attain success (promotion) should increase engagement and devaluing ease (ease-as-triviality) should decrease engagement after experiencing ease, respectively.

We draw on the definition of prevention focus as vigilant guarding from failures (Higgins, 1998) to make the following straightforward predictions. Prevention focus will be positively associated with motivation-increasing lay theory scores (difficulty-as-importance, ease-as-possibility) and negatively associated with motivation-undermining lay theories scores (difficulty-as-impossibility, ease-as-triviality). We predict weak associations with difficulty-as-importance and ease-as-possibility and moderate associations with difficulty-as-impossibility and ease-as-triviality. Our rationale is that prevention focus is about vigilance, which is necessary no matter the odds of success and hence prevention focus should be associated with rejecting those lay theories implying that engagement might not be worthwhile (difficulty-as-impossibility, ease-as-triviality). In contrast, prevention is less associated with concerns about value and self-relevance (difficulty-as-importance, ease-as-possibility) since vigilance is not contingent. Our predictions are in line with research showing that prevention-focused individuals prefer vigilant means to goal pursuit (Idson & Higgins, 2000; for a review, see Higgins & Cornwell, 2016), though we have no direct measure of this match and found none in the literature.

We draw on the definition of construal level as a focus on essential goals or on peripheral means (Trope & Liberman, 2010) to make the following straightforward predictions. An abstract construal will be moderately associated with difficulty-as-importance and with ease-as-triviality scores, while a concrete construal will be moderately associated with difficulty-as-impossibility and ease-as-possibility scores. We make these predictions because abstract construal focuses on the essence and value of a task, therefore an abstract construal is likely to be associated with lay theories that emphasize value (difficulty-as-importance; ease-as-triviality). In contrast, concrete construal is concerned with the means needed to attain an outcome and would therefore be associated with lay theories that emphasize odds of success (difficulty-as-impossibility, ease-as-possibility).

Current Studies

Reliable measures of lay theories of experienced ease and difficulty have not been developed; as a consequence, convergent and dis-

criminant validity with measures of motivation and motivational style have not been assessed. Hence, in the current studies, we had three goals: first, to develop reliable measures (Studies 1 to 5); second, to examine convergent and discriminant validity of these measures with other measures of motivation (Study 4); and third, to place our lay theory measures in context by providing initial evidence of predictive validity. To do so, we used a measure of cognitive style (Study 5) to bridge between our lay theory measures and prior evidence from studies documenting indirectly that interpretation of experience matters for cognitive performance (e.g., Elmore et al., 2016; Smith & Oyserman, 2015).

As a first step, we revised existing lay theories of experienced difficulty measures (Aelenei et al., 2017; Elmore et al., 2016; Oyserman et al., 2015) to develop a set of items for lay theories of experienced ease and difficulty. From this base, we developed six-item measures (Table 2), verified factor structure and reliability, developed short-form (4-item) measures, verified reliability, and used the short-form measures to assess convergent and discriminant validity. We detail the sample, procedure, and analyses plan next.

Samples

Sample information for Studies 1 to 5 is presented in Table 3. We chose our planned sample size ($N = 200$) for each study using the rule of thumb for factor analytic studies; that is, that there should be at least 10 times the number of subjects as the number of items (Everitt, 1975). We maintained this sample size goal for our convergent, discriminant, and predictive validity studies. We met our sample size goal (Study1, $N = 244$; Study 2, $N = 204$; Study 3, $N = 178$; Study 4, $N = 200$; Study 5, $N = 183$) except when our subject pool allotment was somewhat under our goal of 200 (Studies 3 and 5). Participants from Amazon Mechanical Turk (MTurk) workers were compensated $0.45 (Studies 1 and 2) or $1.20 (Study 4, due to longer time request). Participants from the subject pool were undergraduates and compensated with half an hour of participation credit (Studies 3 and 5).

Procedure

Studies were programmed in Qualtrics. Participants were welcomed to "Answer a short survey (~15 minutes) about how you interpret your daily experiences," informed of the voluntary and anonymous nature of the study, provided consent, rated their endorsement of statements, and gave demographic information.

Lay theory of experienced ease and difficulty. In Studies 1, 2, and 4 items were presented first in two randomized blocks—one block included difficulty-as-importance and ease-as-triviality items and the other block included difficulty-as-impossibility and ease-as-possibility items. Items were randomized within blocks. To reduce rote responding, in Studies 1, 2, and 4 the two blocks were separated by a filler that included four unrelated statements about the future. Filler items and a correlation matrix of all items are presented in the supplemental materials (Tables S1 and S2).[2] In Studies 3 and 5, participants were in the subject pool so we did not add the interleaved filler blocks and instead randomized items across all four lay theories. In Study 5, the predictive validity measure (performance task) preceded the lay theory items as detailed below.

Demographics were age, gender, race, education, and income (in that order). There were two exceptions. First, in Study 1 a handling error meant that no demographics were collected. Second, in Studies 3 and 5, participants were undergraduates—so we omitted questions about their own education level (which would be invariant) and income (which would be meaningless). Hence, we could explore demographic associates of responses to lay theories in Studies 2 and 4. We combined the data from both studies in our descriptive analyses presented in the supplemental materials (Table S3).

Other measures of motivation (Study 4) were presented in randomized blocks after the lay theory items, following the same method of randomizing items within blocks. Response scales followed the original measures. Measures

[2] Fillers were not intended to correlate with experienced ease and difficulty and do not.

Table 2
Lay Theories of Experience Measures: Full Text and Exploratory Factor Analysis Factor Loadings (Partial Regression Coefficients)

Interpretation of Experience Scale items	Difficulty-as-importance	Difficulty-as-impossibility	Ease-as-possibility	Difficulty-as-triviality
Difficulty-as-importance lay theory				
When a task feels difficult, the experience of difficulty informs me that succeeding in the task is important for me.	.87			
I know a goal is a key one for me when it feels difficult to work on.	.90			
When taking the steps towards a goal feels difficult, I'm likely to think that the goal is very important for me.	.79			
When I have a gut feeling that something is difficult, then I'm likely to assume it is critical for me.	.77			
When a goal feels difficult to attain, then it is probably worth my effort.	.72			
If a task feels difficult, my gut says that it really matters for me.	.72			
Difficulty-as-impossibility lay theory				
When a goal feels difficult to attain, then it is probably out of my reach.		.91		
I know a goal is impossible for me when it feels difficult to work on.		.86		
When I have a gut feeling that something is difficult, then I'm likely to assume it is impossible for me.		.83		
When taking the steps towards a goal feels difficult, I'm likely to think that the goal is quite impossible for me.		.82		
When a task feels difficult, the experience of difficulty informs me that succeeding in the task is just not possible for me.		.80		
If a task feels difficult, my gut says that it may be impossible for me.		.77		
Ease-as-possibility lay theory				
When a task feels easy, the experience of ease informs me that succeeding in the task is possible for me.			.84	
If a task feels easy, my gut says that it is really possible for me.			.79	
When taking the steps towards a goal that feels easy, I'm likely to think that the goal is quite possible for me.			.78	
When a goal feels easy to attain, then it is probably within my reach.			.76	
When I have a gut feeling that something is easy, then I'm likely to assume it is possible for me.			.75	
I know a goal is possible for me when it feels easy to work on.			.71	
Ease-as-triviality lay theory				
When a goal feels easy to attain, then it is probably not worth my effort.				.87
When taking the steps towards a goal that feels easy, I'm likely to think that the goal is not very important for me.				.85

(*table continues*)

Table 2 (*continued*)

Interpretation of Experience Scale items	Difficulty-as-importance	Difficulty-as-impossibility	Ease-as-possibility	Difficulty-as-triviality
If a task feels easy, my gut says that it doesn't really matter for me.				.84
When a task feels easy, the experience of ease informs me that succeeding in the task is unimportant for me.				.79
When I have a gut feeling that something is easy, then I'm likely to assume it is not important for me.				.73
I know a goal is inconsequential for me when it feels easy to work on.				.66

Note. Participants read: "Please rate the degree to which you agree or disagree with the following statements" (1 = *strongly disagree* to 6 = *strongly agree*). We randomized order for participants but for readability present measures in their factor order and items in order of loading weight, omitting very low loadings below .2.

of motivation as experienced control were Bandura's work self-efficacy (8 items, $\alpha = .93$; Bandura, 2006) and Rotter's locus of control (10 items, $\alpha = .82$; Rotter, 1966). Measures of motivation as resilient character were Duckworth's short-form grit (8 items, $\alpha = .89$; Duckworth & Quinn, 2009), Gucciardi's mental toughness (8 items, $\alpha = .89$; Gucciardi et al., 2015), and Dweck's growth mindset (8 items, $\alpha = .94$; Dweck, 2000). Measures of motivation as goal formulation measures were: Lockwood, Jordan, and Kunda's (2002) operationalization of Higgins' regulatory focus, promotion (6 items, $\alpha = .75$), and prevention (6 items, $\alpha = .92$), and Vallacher and Wegner's (1989) concrete versus abstract construal of goals (25-item Behavioral Identification Form, $\alpha = .93$). The full items used to assess each measure are presented in Table 4.

Predictive validity was assessed through a performance task presented prior to the lay theories of ease and difficulty measures. Prior studies showed effects of primed lay theory of difficulty on various measures of academic performance (Elmore et al., 2016; Horowitz, Sorensen, Yoder, & Oyserman, 2017; Oyserman & Lewis, 2017; Smith & Oyserman, 2015) and various measures of identity (Aelenei et al., 2017; Oyserman et al., 2017; Smith & Oyserman, 2015). Therefore, we assessed association with a general measure of sensitivity to rule-based reasoning. We used a 12-item version of the Cognitive Reflective Task (Ackerman, 2014; Beaman, 2002; Frederick, 2005; Primi, Morsanyi, Ciesi, Donati, & Hamilton, 2015; Thomson & Oppenheimer, 2016). The full set of items (percent correct $M = 44.89$, $SD = 22.88$, $\alpha = .74$) used can be found in Table S4 in the supplemental materials.

Analysis Plan

Measure development. We used exploratory (Study 1) and then confirmatory (Studies 2–5) factor analyses to address our first goal of developing brief measures of lay theories of experienced ease and difficulty. Before conducting exploratory factor analysis, we tested for factorability using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity (Bartlett, 1950; Kaiser, 1970). In Study 1 we chose maximum likelihood with an oblique rotation (direct oblimin) as our exploratory factor analytic model (Fabrigar, Wegener, MacCallum, & Strahan, 1999). This method allowed any factor structure to emerge and allowed for correlations among factors. In Studies 2 to 5 we chose confirmatory factor analyses to test the four-factor result of Study 1, using fixed-factor scaling, setting the variance of each factor to 1, and testing the extent each item loaded onto its respective factor. We contrasted a four-factor solution (difficulty-as-importance, difficulty-as-impossibility, ease-as-triviality, ease-as-possibility) to the fit of a two-factor solution (likelihood—ease-as-possibility and difficulty-as-impossibility, and value—ease-as-triviality and difficulty-as-importance).

After establishing the factor structure, we created lay theory scores and examined these scores as follows. First, we examined whether

Table 3
Studies 1 to 6: Sample Demographic Information Presented as Percentage of Total (Number of Participants) Except for Age, Presented as Average Age (SD)

Demographics	Percentages (number of participants) except age				
	Study 1[a] (N = 220)	Study 2 (N = 204)	Study 3[b] (N = 178)	Study 4 (N = 200)	Study 5 (N = 183)
Age mean (*SD*)		38.31 (13.11)	19.66 (1.76)	36.17 (11.99)	
Gender					
Female		56.37 (n = 115)	70.79 (n = 126)	53.50 (n = 107)	78.1 (n = 143)
Male		43.63 (n = 89)	29.21 (n = 52)	46.50 (n = 93)	21.9 (n = 40)
Race/ethnicity					
African American		13.24 (n = 27)	6.74 (n = 12)	9.00 (n = 18)	6.56 (n = 12)
Asian American		5.39 (n = 11)	32.58 (n = 58)	3.50 (n = 7)	31.15 (n = 57)
European American		70.59 (n = 144)	42.14 (n = 75)	80.00 (n = 160)	49.18 (n = 90)
Hispanic		5.88 (n = 12)	8.43 (n = 15)	5.50 (n = 11)	8.74 (n = 16)
Other		4.90 (n = 10)	10.11 (n = 18)	2.00 (n = 4)	4.37 (n = 8)
Education					
Less than high school		1.96 (n = 4)		1.00 (n = 2)	
High school		6.37 (n = 13)		10.50 (n = 21)	
Some college		26.47 (n = 54)	100 (n = 178)	23.00 (n = 46)	100 (n = 178)
Associate's degree		10.78 (n = 22)		10.50 (n = 21)	
Four-year degree		38.24 (n = 78)		37.00 (n = 74)	
Graduate/professional degree		16.18 (n = 33)		5.00 (n = 10)	
Income					
Less than $10,000		14.22 (n = 29)		9.50 (n = 19)	
$10,000 to $19,999		10.29 (n = 21)		13.50 (n = 27)	
$20,000 to $29,999		11.27 (n = 23)		16.00 (n = 32)	
$30,000 to $39,999		16.18 (n = 33)		12.50 (n = 25)	
$40,000 to $49,999		11.76 (n = 24)		16.50 (n = 33)	
$50,000 to $59,999		11.27 (n = 23)		10.00 (n = 20)	
$60,000 to $69,999		7.35 (n = 15)		6.50 (n = 13)	
$70,000 to $79,999		6.86 (n = 14)		5.00 (n = 10)	
$80,000 to $89,999		3.39 (n = 8)		4.00 (n = 8)	
$90,000 to $99,999		.98 (n = 2)		1.50 (n = 3)	
Greater than $100,000		5.88 (n = 12)		10.00 (n = 5)	

[a] Demographic data were inadvertently excluded, 24 participants skipped questions, resulting in a final sample of N = 200. [b] Income data were not obtained because all participants were undergraduate college students.

each lay theory was measured with adequate reliability, using George and Mallery's (2003) rule of thumb that scale reliability is adequate at Cronbach's alpha >.70. Second, we examined whether each lay theory was endorsed (mean score was significantly above the neutral point) or rejected (mean score was significantly below the neutral point) on average, using single-sample t tests comparing response with neutral point. Third, we examined the correlations among our lay theories of experienced ease and difficulty, conducting a mini meta-analysis combining data across the five studies and using as a rule of thumb Cohen's (1988) cutoffs. Finally, although our samples were not designed to provide a full test of demographic associates, we conducted exploratory multiple regression analyses of potential demographic associates of each lay theory score (presented in the supplemental materials).

Convergent and discriminant validity. We used correlational analyses to address our second goal of verifying convergent and discriminant validity (Campbell & Fiske, 1959; Kline, 2011). Convergent validity involves finding overlap in theoretically linked measures, operationalized as a correlation significantly different from zero (Campbell & Fiske, 1959). Discriminant validity involves finding that theoretically novel measures are distinct from related ones, operationalized as correlations below .85 in absolute magnitude (Kline, 2011). We followed recent construct development work (grit; Duckworth et al., 2007; internal-

Table 4
Motivation Measures Used to Test Convergent and Discriminant Validity in Study 4

Experienced control

Work self-efficacy (Bandura, 2006); 1 (*Strongly Disagree*), 6 (*Strongly Agree*); α = .93
- I am certain I can meet deadlines at work.
- I am certain I can be effective in my work effort regardless of obstacles I face.
- I am certain I can plan, organize, and prioritize work effectively.
- I am certain I can take independent action to fulfill job responsibilities.
- I am certain I can take independent action to support work-related operations.
- I am certain I can plan, organize, and prioritize work effectively.
- I am certain I can take independent action to fulfill job responsibilities.
- I am certain I can partner and collaborate to share information and resources with my coworkers.
- I am certain I can maintain a positive, productive, and comfortable environment at work.
- I am certain I can comply with company policies and procedures.

Locus of control (Rotter, 1966); 1 (*Strongly Disagree*), 5 (*Strongly Agree*); α = .82
- Sometimes I feel that I don't have enough control over the direction my life is taking (R).
- What happens to me is my own doing.
- Many times I might just as well decide what to do by flipping a coin (R).
- Getting what I want has little or nothing to do with luck.
- It is not always wise to plan too far ahead because many things turn out to be a matter of luck anyway (R).
- When I make plans, I am almost certain that I can make them work.
- Becoming a success is a matter of hard work; luck has little or nothing to do with it.
- Becoming a success depends mainly on being in the right place at the right time (R).
- I have often found that what is going to happen will happen (R).
- Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

Resilient character

Growth mindset (Dweck, 2000); 1 (*Strongly Disagree*), 6 (*Strongly Agree*); α = .94
- No matter who you are, you can significantly change your abilities.
- You can always substantially change how able you are.
- No matter the abilities you have, you can always change it quite a bit.
- You can change even your basic abilities considerably.
- You have a certain amount of ability, and you can't really do much to change it (R).
- Your ability is something about you that you can't change very much (R).
- To be honest, you can't really change how able you are (R).
- You can learn new things, but you can't really change your basic abilities (R).

Grit (Duckworth & Quinn, 2009); 1 (*Strongly Disagree*), 6 (*Strongly Agree*); α = .89
- I often set a goal but later choose to pursue a different one (R).
- New ideas and projects sometimes distract me from previous ones (R).
- I have been obsessed with a certain idea or project fro a short time but later lost interest (R).
- I have difficulty maintaining my focus on projects that take more than a few months to complete (R).
- I finish whatever I begin.
- Setbacks don't discourage me.
- I am diligent.
- I am a hardworker.

Mental toughness (Gucciardi et al., 2015); 1 (*Strongly Disagree*), 6 (*Strongly Agree*); α = .89
- I believe in my ability to achieve my goals.
- I am able to regulate my focus when performing tasks.
- I am able to use my emotions to perform the way I want to.
- I strive for continued success.
- I effectively execute my knowledge of what is required to achieve my goals.
- I consistently overcome adversity.
- I am able to execute appropriate skills or knowledge when challenged.
- I can find a positive in most situations.

Goal formulation

Promotion (Lockwood, Jordan, & Kunda, 2002); 1 (*Not at all true of me*), 9 (*Very true of me*); α = .75
- I frequently imagine how I will achieve my hopes and aspirations.
- I often think about the person I would ideally like to be in the future.
- I typically focus on the success I hope to achieve in the future.
- I see myself as someone who is primarily striving to reach my "ideal self"—to fulfill my hopes, wishes, and aspirations.
- In general, I am focused on achieving positives outcomes in my life.
- I often imagine myself experiencing good things that I hope will happen to me.
- Overall, I am more oriented toward achieving success than preventing failure.

Table 4 (*continued*)

Prevention (Lockwood, et al., 2002); 1 (*Not at all true of me*), 9 (*Very true of me*); $\alpha = .92$

In general, I am focused on preventing negative events in my life.
I am anxious that I will fall short of my responsibilities and obligations.
I often think about the person I am afraid I might become in the future.
I often imagine myself experiencing bad things that I fear might happen to me.
I frequently think about how I can prevent failures in my life.
I am more oriented toward preventing losses than I am toward achieving gains.
I see myself as someone who is primarily striving to become the self I "ought" to be—to fulfill my duties, responsibilities, and obligations.

Construal level (Vallacher & Wegner, 1989); H (High level), L (Low level); $\alpha = .93$

Making a list	
a. Getting organized (H)	b. Writing things down (L)
Reading	
a. Following lines of print (L)	b. Gaining knowledge (H)
Joining the army	
a. Helping the nation's defense (H)	b. Signing up (L)
Washing clothes	
a. Removing odors from clothes (H)	b. Putting clothes in the machine (L)
Picking an apple	
a. Getting something to eat (H)	b. Pulling an apple off a branch (L)
Chopping down a tree	
a. Wielding an axe (L)	b. Getting firewood (H)
Measuring a room for carpeting	
a. Getting ready to remodel (H)	b. Using a yardstick (L)
Cleaning the house	
a. Showing one's cleanliness (H)	b. Vacuuming the floor (L)
Painting a room	
a. Applying brush strokes (L)	b. Making the room look fresh (H)
Paying the rent	
a. Maintaining a place to live (H)	b. Writing a check (L)
Caring for houseplants	
a. Watering plants (L)	b. Making the room look nice (H)
Locking a door	
a. Putting a key in the lock (L)	b. Securing the room (H)
Voting	
a. Influencing the election (H)	b. Marking a ballot (L)
Climbing a tree	
a. Getting a good view (H)	b. Holding on to branches (L)
Filling out a personality test	
a. Answering questions (L)	b. Revealing what you're like (L)
Brushing your teeth	
a. Preventing tooth decay (H)	b. Moving a brush around in one's mouth (L)
Taking a test	
a. Answering question (L)	b. Showing one's knowledge (H)
Greeting someone	
a. Saying hello (L)	b. Showing friendliness (H)
Resisting temptation	
a. Saying "no" (L)	b. Showing moral courage (H)
Eating	
a. Getting nutrition (H)	b. Chewing and swallowing (L)
Growing a garden	
a. Planting seeds (L)	b. Getting fresh vegetables (H)
Traveling by car	
a. Following a map (L)	b. Seeing the country side (H)
Having a cavity filled	
a. Protecting your teeth (H)	b. Going to the dentist (L)

(*table continues*)

Table 4 (*continued*)

Talking to a child	
a. Teaching a child something (H)	b. Using simple words (L)
Pushing a doorbell	
a. Moving a finger (L)	b. Seeing if someone's home (H)

Note. R = reverse-scored item.

external motivation to avoid prejudice; Major, Sawyer, & Kunstman, 2013) to set up our analyses. At Step 1 we calculated two mean absolute correlations, tested for the difference between these correlations by examining their confidence intervals, and compared them using the above rules of thumb for size of effect, convergent, and discriminant validity. The first mean absolute correlation was among the measures of motivation (i.e., self-efficacy, locus of control, growth mindset, grit, mental toughness, regulatory focus, and construal level) and the second was between our lay theory of experience measures and each of the measures of motivation. Having completed this initial test, we replicated this comparison within each of the three groups of measures of motivation and motivational style ("motivation as experienced control," "motivation as resilient character," and "motivational as goal formulation"). Step 1 analyses address the core question of validity, which focuses on the absolute magnitude of correlation.

At Step 2, we shifted attention to distinctness of lay theories, addressed by examining the relative magnitude of correlation. These analyses examine the distinctness of lay theories from other measures of motivation by asking if the size of correlation between lay theories and other measures of motivation differs from the size of correlation of measures of motivation with one another. To address this question, we used Fisher's *r*-to-*z* transformation with Steiger's (1980) correction for correlations coming from the same sample.

Predictive validity. We used correlational analyses to address our third goal of providing initial evidence of predictive validity. Predictive validity involves finding a significant correlation between predictor and proposed outcome variables (Cronbach & Meehl, 1955). According to Cronbach and Meehl (1955), predictive validity "is adequately described by the coefficient, and a statement of the experimental and sampling conditions" (p. 283). We chose academic performance (cognitive reflexive task) so that our correlational analyses would be interpretable in light of prior experimental results using indirect assessment of the lay theory measures being validated (e.g., Raven's Progressive Matrices; Smith & Oyserman, 2015).

Results and Discussion

Scale Development

Exploratory factor analyses. Sampling adequacy score of .886 (above .5 suggests factorability) and significant sphericity score at $p < .000$ showed that data were factorable (Bartlett, 1950; Kaiser, 1970). Kaiser's Guttman retention criteria (Kaiser, 1960) and Cattell's scree plot test (Cattell, 1966) revealed a four-factor solution explaining 66% of the total variance (see Table 2). Each factor included items from one lay theory of experienced ease or difficulty and item loading (partial regression coefficient) was always above .66. No items from one lay theory factor loaded onto another lay theory factor (cross-loading was never above .20). Exploratory factor results support the use of four lay theory measures.

Confirmatory factor analyses. In Studies 2 to 5 we replicated Study 1's four-factor solution (factor loadings are displayed in Table 5 and fit indices are displayed in Table 6). The four-factor solution was a good fit across recommended indices of fit; root-mean-square error of approximation (good fit is $<.05$), the comparative fit index (good fit is $>.95$), and the Tucker-Lewis index (good fit is $>.95$; Hu & Bentler, 1999; Jackson, Gillaspy, & Purc-Stephenson, 2009). As shown in Table 6, the two-factor solution was not an adequate fit to the data; none of the fit indices reached criterion. Hence, results support the notion that people have four lay theories relating to difficulty-as-importance, difficulty-as-impossibility, ease-as-triviality, and ease-as-possibil-

Table 5
Full Text of Items in Each Factor With Standardized Regression Coefficients (Standard Error) in Confirmatory Factor Analyses

Interpretation of Experience Scale	Study 2	Study 3	Study 4	Study 5
Difficulty-as-importance lay theory				
If a task feels difficult, my gut says that it really matters for me.	.91 (.07)	.70 (.08)	1.09 (.08)	.78 (.07)
I know a goal is a key one for me when it feels difficult to work on.	1.04 (.07)	.70 (.07)	.94 (.07)	.72 (.07)
When a task feels difficult, the experience of difficulty informs me that succeeding in the task is important.	.99 (.07)	.71 (.07)	1.00 (.07)	.89 (.07)
When a goal feels difficult to attain, then it is probably worth my effort.	.70 (.07)	.52 (.08)	.86 (.07)	.83 (.08)
When I have a gut feeling that something is difficult, then I'm likely to assume it is critical for me.	.96 (.07)			
When taking the steps towards a goal feels difficult, I'm likely to think that the goal is very important.	.96 (.07)			
Difficulty-as-impossibility lay theory				
If a task feels difficult, my gut says that it may be impossible for me.	1.03 (.08)	.65 (.08)	1.11 (.07)	.92 (.08)
I know a goal is impossible for me when it feels difficult to work on.	1.09 (.07)	.60 (.07)	1.06 (.07)	.84 (.09)
When a task feels difficult, the experience of difficulty informs me that succeeding in the task is impossible.	1.12 (.07)	.70 (.07)	1.06 (.07)	.94 (.08)
When a goal feels difficult to attain, then it is probably out of my reach.	1.09 (.07)	.60 (.06)	1.07 (.06)	.94 (.08)
When I have a gut feeling that something is difficult, then I'm likely to assume it is impossible for me.	1.22 (.07)			
When taking the steps towards a goal feels difficult, I'm likely to think that the goal is quite impossible for me.	1.26 (.08)			
Ease-as-possibility lay theory				
If a task feels easy, my gut says that it is really possible for me.	.74 (.06)	.55 (.05)	.87 (.06)	.64 (.07)
I know a goal is possible for me when it feels easy to work on.	.72 (.05)	.53 (.06)	.79 (.06)	.56 (.07)
When a task feels easy, the experience of ease informs me that succeeding in the task is possible.	.66 (.06)	.49 (.06)	.83 (.05)	.68 (.06)
When a goal feels easy to attain, then it is probably within my reach.	.90 (.06)	.48 (.05)	.85 (.06)	.73 (.07)
When I have a gut feeling that something is easy, then I'm likely to assume it is possible for me.	.90 (.06)			
When taking the steps towards a goal that feels easy, I'm likely to think that the goal is quite possible for me.	.94 (.07)			
Ease-as-triviality lay theory				
If a task feels easy, my gut says that it doesn't really matter for me.	.85 (.07)	.75 (.07)	.98 (.07)	.83 (.08)
I know a goal is inconsequential for me when it feels easy to work on.	.90 (.06)	.63 (.07)	.93 (.07)	.77 (.07)
When a task feels easy, the experience of ease informs me that succeeding in the task is unimportant.	.89 (.07)	.70 (.06)	1.01 (.07)	.82 (.07)

(*table continues*)

Table 5 (*continued*)

Interpretation of Experience Scale	Study 2	Study 3	Study 4	Study 5
When a goal feels easy to attain, then it is probably not worth my effort.	.90 (.06)	.66 (.06)	.94 (.07)	.82 (.08)
When I have a gut feeling that something is easy, then I'm likely to assume it is not important for me.	.90 (06)			
When taking the steps towards a goal that feels easy, I'm likely to think that the goal is not very important.	.94 (.06)			

Note. Loadings are standardized regression coefficients with the variance of each latent factor set to 1. Study 2 used the six-item lay theories measures. Studies 3 through 5 used the four-item lay theories measures. The full text of each item is as presented.

ity. We allowed for but did not find alternative factor structures; for example, we did not find a lay theory about likelihood (ease-as-possibility and difficulty-as-impossibility) and a lay theory about value (ease-as-triviality and difficulty-as-importance).

Scale reliability, means, and patterns of endorsement. Scale reliabilities ranged from 0.76 to 0.95, above George and Mallery's (2003) threshold for adequate reliability (Table 7 shows full descriptive information). We compared participant responses with a neutral score of 3.5. Participants agreed that experienced difficulty implies importance (composite Study 1 to 5, $M = 4.10$, $SD = 0.94$; $t(962) = 19.73$, $p < .000$, 95% CI of difference [0.54, 0.66]) and that experienced ease implies possibility (composite Study 1 to 5, $M = 4.93$, $SD = 0.77$; $t(962) = 57.46$, $p < .000$, 95% CI of difference [1.37, 1.47]). They disagreed that experienced difficulty implies impossibility (composite Study 1 to 5, $M = 2.59$, $SD = 1.07$; $t(962) = -26.25$, $p < .000$, 95% CI of difference [−0.98, −0.84]) and that experienced ease implies triviality (composite Study 1 to 5, $M = 2.61$, $SD = .95$; $t(962) = -29.06$, $p < .000$, 95% CI of difference [−0.95, −0.83]).

Scale correlations. In addition to factor analyses, as summarized in Table 8, we examined the correlation among the four lay theories of ease and difficulty and conducted a fixed effects mini meta-analysis, using Comprehensive Meta-Analysis software (Version 3; Biostat, Englewood, NJ) to examine the pattern of correlations. Correlations are not necessarily significant in each study

Table 6
Fit Indices for Four-Factor and Two-Factor Solutions to Confirmatory Factor Analyses

Factor structure by study	RMSEA	CFI	TLI	χ^2	χ^2difference	Δdf
Four-factor solution						
Study 2	.05	.96	.96	383.77		
Study 3	.03	.98	.98	111.84		
Study 4	.07	.95	.95	191.76		
Study 5	.05	.96	.95	144.44		
Adequate fit to data?	Yes: Studies 2, 3, 5, and 6	Yes	Yes			
Simplified two-factor Solution						
Study 2	.18	.56	.52	1,822.92	1439.20	5
Study 3	.14	.58	.51	470.87	359.03	5
Study 4	.22	.56	.48	1,095.46	903.69	5
Study 5	.17	.54	.47	652.11	507.66	5
Adequate fit to data?	No	No	No			

Note. RMSEA = root-mean-square error of approximation: acceptable model fit is denoted by values of .05 or smaller; CFI = comparative fit index: acceptable fit is denoted by values of .95 or higher; TLI = Tucker-Lewis index: acceptable model fit is denoted by values of .95 or higher. χ^2 = Chi-square statistic is typically significant at samples of 200 and hence the difference between simpler and more complex solutions is examined. The simpler solution results in poorer fit as seen by the large increase in χ^2.

Table 7
Means (Standard Deviations) and Cronbach's Alpha Reliability of Each Lay Theory of Experienced Ease and Difficulty Measure in Studies 1–5

	Measures							
	Lay theory difficulty-as- . . .				Lay theory ease-as- . . .			
	Importance		Impossibility		Possibility		Triviality	
Study	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α
1	4.12 (1.00)	.90	2.74 (1.18)	.94	4.87 (.81)	.90	2.70 (1.08)	.92
2	4.01 (.97)	.91	2.77 (1.17)	.95	4.93 (.76)	.91	2.53 (.94)	.92
3	4.28 (.75)	.79	2.21 (.72)	.76	5.11 (.58)	.78	2.57 (.76)	.82
4	3.96 (1.03)	.91	2.67 (1.11)	.93	4.88 (.88)	.91	2.66 (1.03)	.89
5	4.20 (.88)	.83	2.51 (1.00)	.83	4.82 (.74)	.78	2.65 (.89)	.84

Note. α = Cronbach's alpha reliability score. Studies 1, 2, and 4 are MTurk adults; Studies 3, 5, and 6 are college students. Studies 1 and 2 used the six-item version of the lay theories of experience measures, and Studies 3 through 5 used the four-item version of the lay theories of experience measures. Response scales are 1 (*strongly disagree*) to 6 (*strongly agree*).

(Table 8, left panel), but synthesized across studies (Table 8, right panel) are significant (*p*s $<$ .000) and small in size, except for the moderate-sized correlation between the lay theory that experienced ease means triviality and the lay theory that experienced difficulty means impossibility. Correlations are graphically displayed (Figure 1) as diamonds whose edges represent the lower and upper bounds (95% CI) and center represents the mean correlation. Results suggest that each lay theory can be separately assessed and yields a distinct measure. The moderate sized correlation between ease-as-triviality lay theory and difficulty-as-impossibility lay theory suggests a possible unproductive interpretation pair in which both ease and difficulty is demotivating.

Convergent and Discriminant Validity: Using Rules of Thumb

Across measures of motivation and motivational style. We examined the absolute mean correlation among self-efficacy, locus of control, growth mindset, grit, mental toughness, promotion focus, prevention focus, and construal level ($r(200) = 0.39$, 95% CI [0.27, 0.55]) and the absolute mean correlation between these measures of motivation and the four lay theories measures ($r(200) = 0.21$, 95% CI [0.07, 0.35]). In each case, the

Table 8
Studies 1–5: Correlation Between Each Lay Theory of Experience Measure Pair Across Studies and Meta-Analytic Synthesis

	By study correlations					Synthesis across studies		
Lay theory of experience measure pair	Study 1 (N = 221)	Study 2 (N = 204)	Study 3 (N = 178)	Study 4 (N = 200)	Study 5 (N = 183)	Correlation estimate	95% CI	*Z* score
Lay theory								
Impossibility, importance	−.04	−.15*	−.26**	−.08	−.08	−.12	−.18, −.06	−3.72
Impossibility, possibility	−.13*	−.09	−.26**	−.15*	−.14	−.15	−.21, −.09	−4.76
Possibility, triviality	−.23**	−.26**	−.26**	−.05	−.23**	−.21	−.27, −.15	−7.78
Importance, triviality	.22**	.29**	.16*	.32**	.05	.21	.15, .27	6.78
Importance, possibility	.18**	.08	.27**	.33**	.34**	.24	.18, .30	7.56
Impossibility, triviality	.48**	.40**	.25**	.46**	.60**	.45	.39, .50	14.97

Note. By study correlations, * $p < .05$; ** $p < .0$. Synthesis across studies: all correlations are significant, $p < .000$. Studies 1 and 2 used the six-item lay theories measures. Studies 3 through 5 used the four-item lay theories measures. Impossibility denotes a difficulty-as-impossibility lay theory. Importance denotes a difficulty-as-importance lay theory. Possibility denotes an ease-as-possibility lay theory. Triviality denotes an ease-as-triviality lay theory. CI = confidence interval.

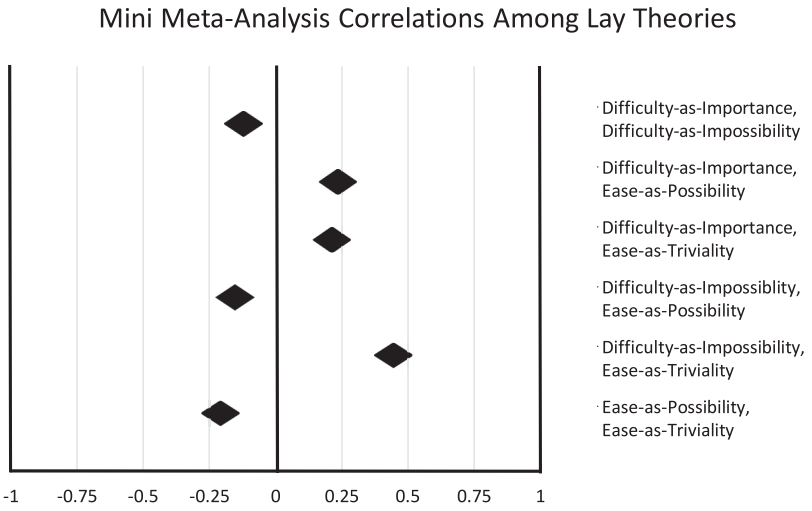

Figure 1. Mini-meta analysis: estimated correlations between lay theories of experience measures. The left edge of each diamond represents the lower bound of the confidence interval, the right edge of each diamond represents the higher bound of the confidence interval, and the midpoint of each diamond represents the average estimated correlation between the two measures.

lower bound of the confidence interval provides evidence for convergent (>0) validity and the upper bound of the confidence interval provides evidence for discriminant (<.85) validity. Moreover, the confidence intervals overlap, implying that the correlations among measures of motivation and between these measures of motivation and lay theory measures are of the same magnitude. Hence, lay theories of experienced ease and difficulty measures can be considered additions to other measures of motivation rather than redundant with them—since these measures are not considered redundant with one another.

Correlations across measures of motivation as experienced control. Next we turned to the correlations among the measures of motivation as experienced control, finding a medium-to-large-sized correlation between work self-efficacy and locus of control, $r(200) = 0.49$, $p < .01$, 95% CI [0.40, 0.68]. As presented in Table 9, all correlations between these measures and our lay theory measures met criteria for discriminant and convergent validity, with two exceptions. Lo-

Table 9
Correlations Between Lay Theories of Experienced Ease and Difficulty and Measures of Experienced Control

Measures	Efficacy	Locus of control
Motivation as experienced control		
Efficacy		
Locus of control	.49** (.38, .59)	
Lay theories of experience measures		
Difficulty-as-importance	.17* (.03, .30)	−.01 (−.15, .13)
Difficulty-as-impossibility	−.52** (−.61, −.41)	−.40** (−.51, −.28)
Ease-as-possibility	.32** (.19, .44)	.08 (−.06, .22)
Ease-as-triviality	−.26** (−.38, −.13)	−.28** (−.40, −.15)

* $p < .05$. ** $p < .01$ level.

Table 10
Correlations Between Lay Theories of Experienced Ease and Difficulty and Measures of Resilient Character

Measures	Growth mindset	Grit	Mental toughness
Motivation as resilient character			
Growth mindset			
Grit	.27** (.14, .39)		
Mental toughness	.31** (.18, .43)	.68** (.60, .75)	
Lay theories of experience measures			
Difficulty-as-importance	.07 (−.07, .21)	.15* (.01, .28)	.27** (.14, .39)
Difficulty-as-impossibility	−.34** (−.46, −.21)	−.54** (−.63, −.43)	−.47** (−.57, −.36)
Ease-as-possibility	.17* (.38, .59)	.09 (−.05, .22)	.15* (.01, .28)
Ease-as-triviality	−.24** (−.51, −.28)	−.20** (−.33, −.06)	−.17* (−.30, −.03)

* $p < .05$. ** $p < .01$ level.

cus of control is distinct from both difficulty-as-importance ($r(200) = -0.01$, $p > .05$, 95% CI [−0.15, 0.13]) and ease-as-possibility ($r(200) = 0.08$, $p > .05$, 95% CI [−0.06, 0.22]). In each case, confidence intervals include 0 hence the criteria of $r > 0$ is not met, implying that difficulty-as-importance and ease-as-possibility lay theories do not have a common link with locus of control.

Correlations across measures of motivation as resilient character. With regard to correlations among measures of motivation as resilient character, we found a small-to-moderate-sized correlation between grit and growth mindset ($r(200) = 0.27$, $p < .01$, 95% CI [0.14, 0.39]), a small-to-moderate-sized correlation between mental toughness and growth mindset ($r(200) = 0.31$, $p < .01$, 95% CI [0.18, 0.43]), and a large-sized correlation between grit and mental toughness ($r(200) = 0.68$, $p < .01$, 95% CI [0.60, 0.75]). As presented in Table 10, all correlations between these measures and our lay theory measures met criteria for discriminant and convergent validity, with two exceptions. Growth mindset is distinct from difficulty-as-importance ($r(200) = 0.07$, $p > .05$, 95% CI [−0.07, 0.21]). Grit is distinct from ease-as-possibility ($r(200) = 0.09$, $p > .05$, 95% CI [−0.05, 0.22]). In each case, confidence intervals include 0, hence the criteria of $r > 0$ is not met, implying that difficulty-as-importance lay theory does not have a common link with growth mindset and that ease-as-possibility lay theory does not have a common link with grit as measures of motivation.

Correlations across measures of motivation as goal formulation. We examined correlations among measures of motivation as goal formulation, finding a small-sized correlation between prevention focus and construal level ($r(200) = -0.13$, $p > .05$, 95% CI [−0.26, −0.01]), and medium-sized correlations between promotion focus and construal level ($r(200) = 0.36$, $p < .01$, 95% CI [0.23, 0.48]), and between promotion and prevention focus ($r(200) = -0.33$, $p < .01$, 95% CI [−0.45, −0.20]). As presented in Table 11, correlations between these measures and our lay theory measures met criteria for discriminant and convergent validity, with five exceptions. Promotion focus is distinct from ease-as-triviality ($r(200) = -0.08$, $p > .05$, 95% CI [−0.22, 0.06]). Prevention focus is distinct from difficulty-as-importance ($r(200) = 0.03$, $p > .05$, 95% CI [−0.11, 0.17]) and ease-as-possibility ($r(200) = 0.00$, $p > .05$, 95% CI [−0.14, 0.14]). Construal level is distinct from ease-as-possibility ($r(200) = 0.11$, $p > .05$, 95% CI [−0.03, 0.24]) and ease-as-triviality ($r(200) = 0.01$, $p > .05$, 95% CI [−0.13, 0.15]). In each case, confidence intervals include 0, hence the criteria of $r > 0$ is not met, implying that ease-as-triviality lay theory does not have a common link with promotion focus; difficulty-as-importance and ease-as-possibility lay theories do not have a common link with prevention focus, that ease-as-possibility and ease-as-triviality lay theories do not have a common link with construal level.

Convergent and Discriminant Validity: Differences in Magnitude of Correlations

Motivation as experienced control. Results are presented graphically in the top panels of Figures 2 and 3, and detailed in Table S5 in the supplemental materials. As can be seen, each of the four lay theories of experienced ease and

Table 11
Correlations Between Lay Theories of Experienced Ease and Difficulty and Measures of Goal Formulation

Measures	Promotion	Prevention	Construal level
Motivation as goal formulation			
Promotion			
Prevention	−.33** (−.45, −.20)		
Construal level	−.36** (−.48, −.23)	−.13 (−.26, .01)	
Lay theories of experience measures			
Difficulty-as-importance	.33** (.20, .45)	.03 (−.11, .17)	.22** (.08, .35)
Difficulty-as-impossibility	−.34** (−.48, −.21)	.49** (.38, .59)	−.22** (−.35, −.08)
Ease-as-possibility	.25** (.12, .38)	.00 (−.14, .14)	.11 (−.03, .24)
Ease-as-triviality	−.08 (−.22, .06)	.25** (.12, .38)	.01 (−.13, .15)

** $p < .01$.

difficulty were each significantly less or as correlated with efficacy and with locus of control than efficacy and locus of control were with each other. This means that lay theories of ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility are both theoretically and likely also empirically distinct from locus of control and efficacy, adding meaningfully to variance explained over and above efficacy or locus of control.

Motivation as resilient character. As presented graphically in the middle panels of Figures 2 and 3, and detailed in Table S6 in the supplemental materials, ease-as-triviality, ease-as-possibility, and difficulty-as-importance were each significantly less or as correlated with measures of motivation as resilient character as they were with each other. Findings differed somewhat with regard to difficulty-as-impossibility. Difficulty-as-impossibility was significantly more correlated with grit ($r(200) = -0.54$, $p < .01$, 95% CI [−0.63, −0.43]) and with mental toughness ($r(200) = -0.47$, $p < .01$, 95% CI [−0.57, −0.36]) than growth mindset was with grit ($Z = 2.16$, $p < .01$) or with mental toughness ($Z = 3.78$, $p < .01$).

This means that lay theories of ease-as-possibility, ease-as-triviality, and difficulty-as-importance are not only theoretically distinct but likely are also empirically distinct from growth mindset, grit, and mental toughness, adding meaningfully to variance explained over and above growth, grit, and mental toughness. Difficulty-as-impossibility is both theoretically distinct and also empirically distinct from growth mindset. While meeting criteria for discriminant validity, it is less empirically distinct from lack of grit or lack of mental toughness.

Motivation as goal formulation. As presented graphically in the bottom panels of Figures 2 and 3, and detailed in Table S7 in the supplemental materials, ease-as-triviality, ease-as-possibility, and difficulty-as-importance were each significantly less or as correlated with measures of motivation as goal formulation as they were with each other. Findings differed somewhat with regard to difficulty-as-impossibility. Here the correlation with prevention focus ($r(200) = 0.49$, $p < .01$, 95% CI [0.38, 0.59]) was greater in magnitude than the correlation between prevention and promotion focus ($Z = 2.22$, $p < .05$) and the correlation between prevention focus and construal level ($Z = 4.40$, $p < .01$).

This means that lay theories of ease-as-possibility, ease-as-triviality, and difficulty-as-importance are not only theoretically distinct but likely are also empirically distinct from regulatory focus and construal level, adding meaningfully to variance explained over and above these measures of goal formulation. While meeting criteria for discriminant validity, difficulty-as-impossibility is less empirically distinct from prevention focus than it is from promotion focus and construal level.

Predictive Validity: Patterns of Correlation

Lastly, we examined the predictive validity of our lay theories of ease and difficulty measures by examining patterns of correlation with performance on the Cognitive Reflexive Task and mean endorsement of ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility lay theories. Better performance on the Cognitive Reflexive Task was associated with higher ease-as-possibility

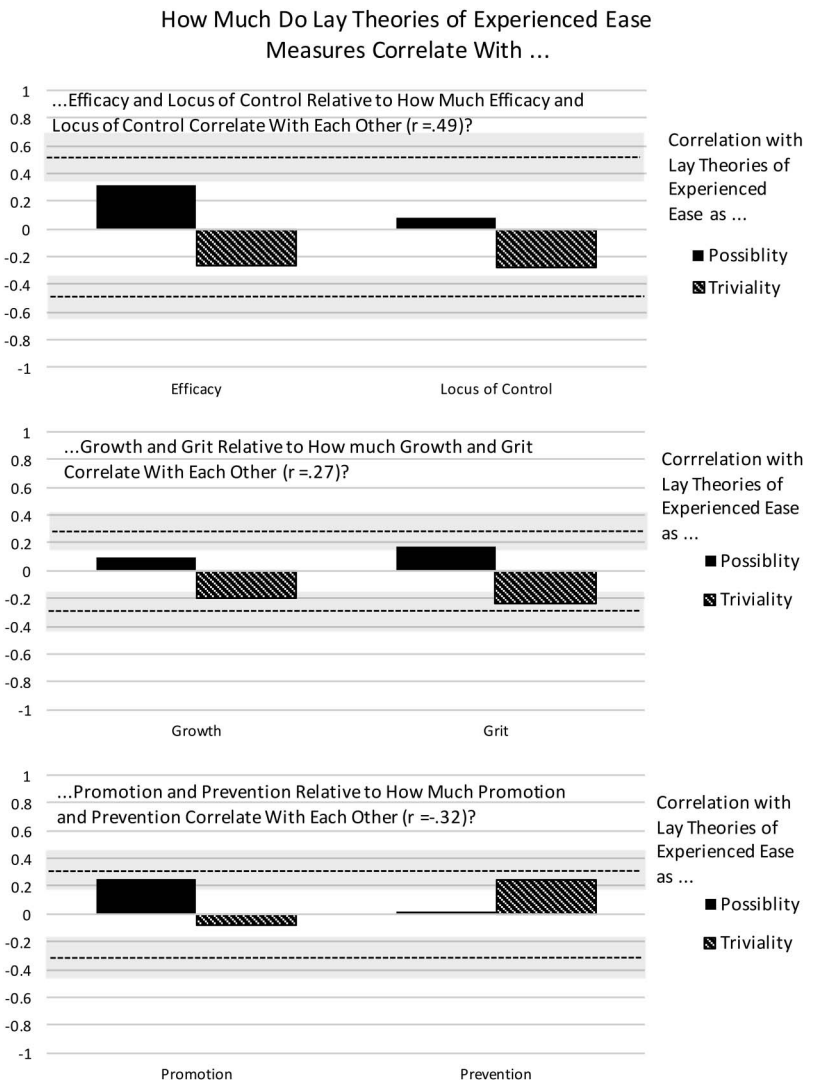

Figure 2. Comparing differences in magnitude of correlations: contrasting lay theories of experienced ease with measures of motivation in three domains. *Note*: the dotted lines signify the correlation between the measures of motivation in each panel (efficacy and locus of control, $r = .49$; growth and grit, $r = .27$; promotion and prevention, $r = -.33$). Bars represent the correlations between lay theories of experienced ease and each measure of motivation. Because we are interested in whether the correlations between the lay theories and other measures motivation differ from one another in absolute size, we use the magnitude of correlations between the measures of motivation in each domain as our standard. The gray shaded region surrounding the dotted lines signifies the range of correlations that would not be significantly different in magnitude. Correlations within the shaded region are significantly smaller in magnitude and correlations outside the shaded region are significantly larger in magnitude than the correlation between measures of motivation in each domain.

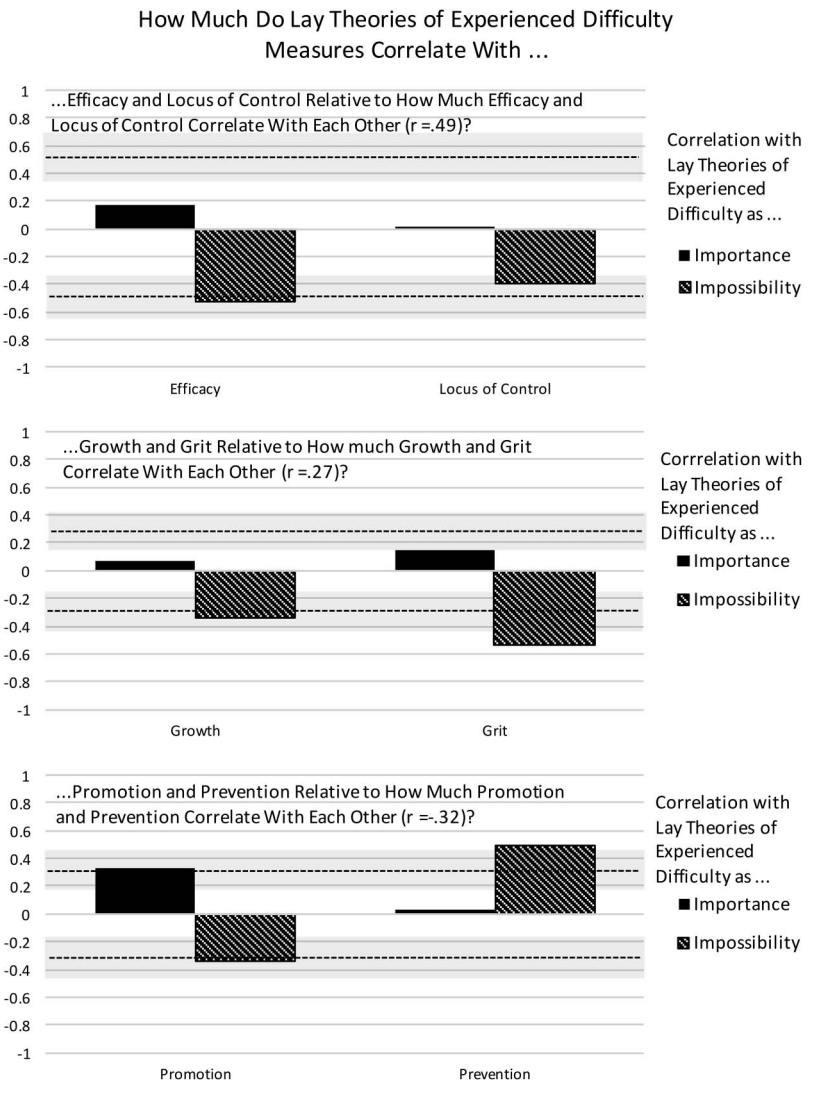

Figure 3. Comparing differences in magnitude of correlations: contrasting lay theories of experienced difficulty with measures of motivation in three domains. *Note:* the dotted lines signify the correlation between the measures of motivation in each panel (efficacy and locus of control, $r = .49$; growth and grit, $r = .27$; promotion and prevention, $r = -.33$). Bars represent the correlations between lay theories of experienced difficulty and each measure of motivation. Because we are interested in whether the correlations between the lay theories and other measures motivation differ from one another in absolute size, we use the magnitude of correlations between the measures of motivation in each domain as our standard. The gray shaded region surrounding the dotted lines signifies the range of correlations that would not be significantly different in magnitude. Correlations within the shaded region are significantly smaller in magnitude and correlations outside the shaded region are significantly larger in magnitude than the correlation between measures of motivation in each domain.

($r(183) = 0.20$, $p < .01$, 95% CI [0.06, 0.36]), lower difficulty-as-impossibility ($r(183) = -0.29$, $p < .01$, 95% CI [−0.49, −0.15]), and lower ease-as-triviality ($r(183) = -0.26$, $p < .01$, 95% CI [−0.39, −0.12]) lay theory endorsement. Cognitive Reflexive Task scores were not associated with endorsement of difficulty-as-importance ($r(183) = -0.03$, $p > .05$, 95% CI [−0.17, 0.12]).

General Discussion

Almost anything a person does can feel easy or difficult; people may or may not infer something from these feelings, but they often do. To date, research has documented effects of the lay theories people hold about what ease and difficulty imply indirectly by creating an experience of ease or difficulty or by guiding participants to use a particular lay theory. To test the effects of lay theories of what ease and difficulty imply directly requires a way to measure lay theory endorsement. In the current studies, we developed short reliable measures of lay theories of ease and difficulty and showed that each is a separate indicator. People separately experience ease as implying possibility and as implying triviality; they separately experience difficulty as implying importance and as implying impossibility. A meta-analysis across five studies showed that the correlations among the lay theories were of small size except for a moderate correlation between difficulty-as-impossibility and ease-as-triviality lay theories, implying that in some conditions, both ease and difficulty can undermine motivation.

We compared the correlation between each lay theory and other measures of motivation and motivational style using rules of thumb for convergent and discriminant validity. We also looked at the relative size of the correlation between each lay theory and measures of motivation within three domains, which we labeled motivation as experienced control, motivation as resilient character, and motivation as goal formulation. These analyses showed that lay theories of ease and difficulty can be used in addition to other measures of motivation, adding to variance explained. Two lay theories stood out as particularly distinct from other measures of motivation—ease-as-possibility and difficulty-as-importance.

We explored demographic associates of endorsing lay theories of ease and difficulty finding three: age, social status, and race. Older and younger participants showed the same pattern of endorsing lay theories of ease-as-possibility and difficulty-as-importance and rejecting lay theories of ease-as-triviality and difficulty-as-impossibility. However, older participants agreed more with the ease-as-possibility lay theory and less with difficulty-as-importance, difficulty-as-impossibility, and ease-as-triviality lay theories. In addition, lower social status was associated with more endorsement of difficulty-as-impossibility and stigmatized minority racial-ethnic group membership was associated with higher endorsement of difficulty-as-importance and ease-as-triviality.

To begin to establish predictive validity, we examined the correlations between our lay theory measures and a measure of academic performance. We picked an academic outcome to link with prior studies which found improved academic outcomes among students guided to consider difficulty-as-importance compared to students guided to consider difficulty-as-impossibility (Smith & Oyserman, 2015). We generally found the predicted associations; endorsing ease-as-possibility and rejecting difficulty-as-impossibility and ease-as-triviality were associated with better performance on the Cognitive Reflective Task, a task requiring noticing that a rule is required to solve a problem and correctly applying it. Since prior studies did not include priming of ease lay theories, our current results provide important initial evidence that interpreting ease matters for academic performance. However, prior studies showed a positive effect of priming difficulty-as-importance on cognitive performance and centrality of academics in identity (e.g., Smith & Oyserman, 2015). Yet when measured in the current studies, we found no correlation between endorsing difficulty-as-importance and performance. One possibility is that these differences are due to differences in the specific performance measures we used in this study compared with the prior studies.

Implications and Connections

Each lay theory (ease-as-possibility, ease-as-triviality, difficulty-as-importance, difficulty-as-impossibility) measure met criteria for dis-

criminant validity and was less or no more correlated with measures of motivation than these measures were with each other. Thus, lay theories of experienced ease and difficulty add to research on efficacy, locus of control, growth, grit, mental toughness, prevention focus, promotion focus, and construal level. This is the case even for difficulty-as-impossibility, which, though meeting criteria for discriminant validity, had relatively higher correlations with lack of grit, lack of mental toughness, and with higher prevention focus. The implication is that one way in which lack of grit and lack of mental toughness matter is via a difficulty-as-impossibility lay theory: if something is impossible, there is no point persisting after all. With regard to prevention focus, the implication is that one way that vigilant guarding against failure might be attained is by being sensitive to the possibility that difficulty implies impossibility. Beyond value from fit explanations (Higgins, 2005; Mann, Sherman, & Updegraff, 2004), the association of prevention focus with difficulty-as-impossibility beliefs might explain why prevention focus has been found to be helpful in risky contexts (e.g., Scholer, Stroessner, & Higgins, 2008; Scholer et al., 2010; for a review, see Scholer & Higgins, 2013). Risky contexts may be failure-likely settings, knowing when to switch attention to something else could be useful in these settings—for example, when the cost of switching is low and the cost of staying on task is high.

By developing and validating short reliable measures of ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility, we set the stage for research examining when experiences of ease and difficulty are motivating and when they are demotivating. Having brief measures is likely to be helpful in understanding seemingly conflicting findings about experienced ease and difficulty. For example, having measures of ease-as-possibility and ease-as-triviality allows for studies to understand why experienced ease is associated both with feelings of mastery (Koriat, Ma'ayan, & Nussinson, 2006) and with feelings of boredom and disengagement from schoolwork (Kanevsky & Keighley, 2003). Similarly, having brief measures is likely to be helpful in understanding parallel effects of experienced difficulty as implying both importance and impossibility. The small negative correlation between the measures implies that on average, people hold both lay theories in mind. This is consistent with evidence that people can focus on one lay theory or the other depending on contextual cues (Aelenei et al., 2017; Elmore et al., 2016; Smith & Oyserman, 2015). Moreover, having measures adds to the research toolkit, complementing priming methods and implicit association methods (O'Donnell & Oyserman, 2017). For some purposes, explicit endorsement may be useful; for other purposes, salient lay theory may matter, separate from its endorsement (e.g., Oyserman et al., 2017).

Our results are important for research on the motivational consequences of lay theories of experienced ease and difficulty for learning, judgment, and identity-based motivation. With regard to learning and judgment, previous research has focused on creating conditions in which ease or difficulty while thinking is likely to be experienced. Researchers have inferred from results what likely inferences about ease or difficulty might have been (Bjork et al., 2013; Schwarz, 2015). In the context of research on judgments of learning, for example, people often use experienced ease and difficulty to infer the likelihood of remembering some information that has been studied for a future test (for a review, see Bjork et al., 2013). Following an ease-as-possibility lay theory, ease is often incorrectly interpreted as meaning that one has already learned or mastered the work (Bjork et al., 2013; Koriat et al., 2006). Following a difficulty-as-impossibility lay theory, students often reject attempts to teach them to use more difficult but more effective study strategies (Yan et al., 2016). By adding measures of ease-as-triviality and difficulty-as-importance, learning researchers can expand their focus.

More generally, by providing measures of lay theories of experienced ease and difficulty, our work provides tools to test the circumstances in which experienced ease and difficulty are likely to lead to better task-related motivation and outcomes. Research to date highlights two possible venues for future research. The first venue focuses on differences in the structure of tasks. Thus, rule-based tasks such as many tasks in academic contexts are likely to benefit from not interpreting experienced difficulty as impossibility but instead as importance and hence increasing effort in the form of more time on task, when the task feels difficult. In contrast, insight-

based tasks such as creativity tasks or associative reasoning tasks may not benefit from spending more time and may be more efficiently handled when experienced difficulty is understood as meaning impossibility and attention shifted to something else (for relevant research, see Ackerman, 2014). The second venue focuses on life span and other forces influencing the relative benefits of sticking to a self-relevant goal versus changing course. While researchers typically focus on the ability to stick to a goal, age, physical, and mental health, among other factors, may make letting go of a self-relevant goal a necessity (e.g., King & Raspin, 2004; Pizzolato, 2007). By freeing one's energy to develop a new goal, a difficulty-as-impossibility lay theory may be productive in situations in which goals are actually impossible or unattainable (for a review, see Wrosch, 2010).

Limitations and Future Directions

We developed brief reliable measures of lay theories of what ease and difficulty imply and examined their convergent and discriminant validity, showing that people hold four lay theories which seem distinct from one another. Our participants were the groups commonly used in psychological research using measures of motivation—MTurk and college students. This was a reasonable place to start. That said, understanding how our lay theories of ease and difficulty measures function across a broader range of age, economic status, and cultural backgrounds is an important next step. More research involving economically and socially diverse groups and other measures of social status (e.g., Piff, Kraus, Côté, Cheng, & Keltner, 2010) is needed to obtain a better estimate of the relationship between chronic endorsement of motivating (ease-as-possibility, difficulty-as-importance) and demotivating (ease-as-triviality, difficulty-as-impossibility) lay theories of experienced ease and difficulty and socioeconomic status. Similarly, we used one set of common theories of motivation and one set of measures to operationalize each; future research could test links to other motivating frames and could use other measures of the theories we currently used since each might be limited (e.g., Haws et al., 2010 on our measures of regulatory focus).

Rather than a single lay theory of ease versus difficulty or a set of lay theories of value and of expectancy, we found evidence that people hold four distinct lay theories: ease-as-possibility, ease-as-triviality, difficulty-as-importance, and difficulty-as-impossibility. Endorsement of one lay theory had only small overlap with endorsement of another (correlations were small in magnitude), with the exception of a moderate-sized correlation between endorsing difficulty-as-impossibility and ease-as-triviality lay theories. There are a number of implications of the finding that people hold four separate lay theories about their experienced ease and difficulty and each is worthy of future research. The first implication of finding four separate lay theories is that at least in some circumstances, both ease and difficulty can be demotivating, just as both can be motivating. That difficulty can be motivating is consistent with motivation intensity theory, which states that increased difficulty leads to increased motivation until the difficulty becomes overwhelming or the value of engagement is no longer worth the effort (for reviews, see Brehm & Self, 1989; Richter, Gendolla, & Wright, 2016). Indeed, as summarized by Richter and colleagues, difficulty does show this pattern, when motivation is assessed as cardiovascular physiological arousal, but not always when motivation is measured by performance or behavior (for a review, see Richter et al., 2016). Our lay theory framework suggests that this variability is due to (unassessed) differences in what experienced difficulty is taken to mean; performance effects may be due to endorsing difficulty-as-importance or to rejecting difficulty-as-impossibility (e.g., Elmore et al., 2016; Horowitz et al., 2017). Cardiovascular arousal may also be compatible with rejecting difficulty-as-importance or accepting difficulty-as-impossibility cues, resulting in no necessarily consistent link from behavior to arousal. Which lay theory comes to mind in the moment may be driving whether difficulty bolsters performance and not just arousal, but lay theories are not assessed in these studies, so it is hard to know.

The second implication of finding four separate lay theories of ease and difficulty is that when one lay theory of experienced ease or difficulty is reinforced by experience, other lay theories are unlikely to be influenced. Hence, even if a person is routinely reinforced for interpreting difficulty as importance, that will not

make him or her invulnerable to cues that difficulty means impossibility. Reinforcement that ease means possibility does not make one invulnerable to cues that ease means triviality. Indeed, identity-based motivation theory predicts a bidirectional relationship between salient identities and salient lay theories of ease and difficulty and assumes that what a salient identity implies is dynamically constructed in context (Oyserman, 2015).

A third implication of finding four separate lay theories of ease and difficulty is that whether a productive or unproductive interpretation of ease or of difficulty comes to mind is likely to be function of the fit between accessible lay theory and experience. Just as fit between how means and ends are framed matters within regulatory focus theory (e.g., Higgins, 2005), some form of fit may matter for whether experienced ease and difficulty are motivating or demotivating. Strong adherence to the Protestant Ethic (Mirels & Garrett, 1971) might make it more likely that ease will be dismissed as triviality, for example, so that if difficulty is valued as character building, people may be demotivated by ease, even when it could help them attain their goals. Our correlational finding that performance is associated with endorsing ease-as-possibility and rejecting ease-as-triviality is interesting, but in the moment, an easy task may or may not evoke both lay theories.

A fourth implication of finding four separate lay theories of ease and difficulty is that they can be added to other measures of motivation to better understand underlying processes. For example, given the literature on the positive consequences of efficacy (Bandura, 2006), it would be useful to examine the relative explanatory power of lay theories of ease and difficulty and other measures of motivation, including grit and growth mindset on feelings of efficacy. Other mediational analyses also are possible, given our lay theory measures. For example, interventions using growth mindset highlight that believing that ability can change influences outcomes (Yeager & Dweck, 2012). While not yet tested, it is possible that positive effects of such interventions are mediated by change in lay theories of experienced difficulty away from the difficulty-as-impossibility lay theory (for detailed development of this idea, see Lewis & Oyserman, in press; Oyserman & Lewis, 2017; Oyserman & Fisher, in press).

A final implication comes from our initial test of predictive validity. We found some evidence that performance is associated with a particular pattern of endorsement of lay theories of ease and difficulty: that ease means possibility (so one should "get going") and not triviality ("too easy to care") and that difficulty does not mean impossibility ("do not quit"). We did not find evidence that performance is associated with endorsing difficulty-as-importance in spite of prior priming studies suggesting that guiding people to use this lay theory promotes performance on difficult academic tasks (Aelenei et al., 2017; Elmore et al., 2016; Oyserman et al., 2017; Smith & Oyserman, 2015). Perhaps our current task was not difficult enough for difficulty-as-importance to matter, or perhaps because people's implicit and explicit beliefs about what difficulty implies are not related (O'Donnell & Oyserman, 2017), theory on the mind matters. This is a future venue of research deserving of further attention. Because a difficulty-as-importance lay theory has little overlap with other measures of motivation, focusing on this lay theory can be of both theoretical and applied significance.

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