Identity-based motivation is context-dependent (state-like) and trait-like: Each matters

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Author note: Corresponding author: Daphna Oyserman. We thank our participants for contributing their time and opinions, our USC IBM lab members for their helpful feedback, and our colleagues, Drs. Gülnaz Kiper and Oliver Fisher for help with data collection.

CRediT Authorship Contribution Statement

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Preprint

Version Date: August 22, 2025

Submitted for Publication

Abstract

People can draw two inferences about themselves when a task or goal feels hard to think about: "This is important to me, worthwhile" (difficulty-as-importance) and "This is not for me, a waste of time" (difficulty-as-impossibility). Identity-based motivation theory makes three predictions that have not been directly tested: First, people make both inferences (ecological validity). Second, endorsement varies across people and situations (trait-state) and matters for self-perception and action (consequential). Third, unambiguous contexts (context) shift momentary endorsements. We address this gap using validated difficulty-as-importance and difficulty-as-impossibility scales across five studies (N = 2,746), finding support for each prediction. Ecological validity: people recall making both inferences a few times a month (Study 1, N=986 undergraduates). Trait-state: difficulty-as-importance and difficulty-as-impossibility scores differ between persons and fluctuate within-persons (Study 2, three time-points, N=733 middle schoolers and high schoolers; Study 4, N=260 undergraduates, *n*=2,789 two-week daily diaries). Consequential: trait difficulty-as-impossibility predicts later preference for easier tasks (Study 3, N=216 undergraduates); trait difficulty-as-importance predicts daily meaningful engagement with school (Study 4). Daily fluctuations in both are associated with daily self-esteem, self-compassion, and goal self-efficacy (Study 4). Context: unambiguous contexts shape momentary difficulty-as-importance and difficulty-as-impossibility scores (Study 5, N=551 undergraduates).

Keywords: identity-based motivation, well-being, task engagement, trait and state effects, difficulty mindsets

Public Significance (129 of 150 words)

- People differ in how much they endorse two beliefs about what it means when a task or goal feels difficult to think about: it is important (self-relevant and valuable) and impossible (unlikely, not worth the effort); endorsements of both can be measured with brief, validated scales, and people regularly experience difficulty in both ways.
- Both between-person (trait-like) differences and fluctuations within a person (state) in endorsing difficulty-as-importance and difficulty-as-impossibility are associated with daily life; trait difficulty-as-importance endorsement predicts daily engagement with school, and daily endorsement of difficulty-as-importance and difficulty-as-impossibility relate to daily goal self-efficacy, self-compassion, and self-esteem.
- Contexts matter too; when people work on a difficult and potentially self-relevant task, their difficulty-as-importance beliefs are dampened and difficulty-as-impossibility beliefs are enhanced if the context clearly implies no chance of success.

Identity-based motivation is context-dependent (state-like) and trait-like: Each matters

Experiences of difficulty are an often overlooked aspect of self-perception and motivation. Following identity-based motivation theory, people can draw two inferences when they experience difficulty thinking about potentially self-relevant tasks or goals (Oyserman, 2007, 2009, 2015, 2024). They can infer that difficulty signals self-relevance and value (difficulty-as-importance–this is important to me, "no pain, no gain") and self-irrelevance and low odds of success (difficulty-as-impossibility–this is not for me, "know when to walk away"). Identity-based motivation theory makes three core predictions about these inferences. First, people make difficulty-as-importance and difficulty-as-impossibility inferences in everyday life. Second, how much they endorse each is both stable (trait-like) and situated (state-like), and both trait and state endorsement shape how people think about themselves and what they do. Third, unambiguous contexts influence state endorsements. As summarized next, though identity-based motivation theory has yielded a large body of research documenting that difficulty-as-importance and difficulty-as-impossibility inferences from difficulty matter, these core predictions have not been directly tested; we do so in the current studies.

Identity-Based Motivation Theory

Identity-based motivation (IBM) theory is a situated social cognition theory of motivation, goal pursuit, and self-regulation (Oyserman, 2007, 2009, 2024). IBM theory predicts that people prefer to act (action-readiness) and make sense of their metacognitive experiences (procedural-readiness) in ways that fit their identities, but which aspects of identity come to mind and what they imply are dynamically constructed given features of the situation (Oyserman, 2007; 2015). It predicts that the three elements recursively connect. Thus, situational cues can trigger a particular inference from metacognitive experience and hence shifts in self-perception

and action, and the reverse, self-perceptions can shape inferences from metacognitive experience and action.

As a situated social cognitive theory, IBM assumes that human judgments are based on the subset of all the information available in memory that is currently on the mind (Wyer, 2008) and feels relevant to the at-hand judgment task (Schwarz, 2024). Thinking is for doing; people use the content of their thinking and the inferences they draw from their experience of thinking (i.e., metacognition) when making judgments (Schwarz, 2024). Features of the situation can make information stored in memory momentarily top-of-mind and hence accessible for use (Smith & Semin, 2004). With repeated use, available information can become trait-like, chronically top-of-mind (e.g., Higgins, 1996). This situated cognition process implies that the strength of a situational effect on judgment is a function of the extent to which the situation is ambiguous versus unambiguous. Unambiguous situations more strongly shape perception, action, and inferences, while responses to ambiguous situations are shaped by what is top-of-mind at the moment of judgment (e.g., Cihangir et al., 2010; Smith & Conrey, 2009). IBM theory applies the logic of social cognition to self, self-concept, and identity (Oyserman, 2007). The IBM-based prediction is that contexts shape the extent to which a difficulty-as-importance or difficulty-as-impossibility lens is accessible and endorsed in unambiguous contexts, while in ambiguous contexts, people's chronic difficulty-as-importance and difficulty-as-impossibility beliefs allow people to make sense of themselves and direct attention and action.

Next, we summarize the IBM-relevant research evidence. As we will show, research to date has provided the groundwork. First, it establishes valid, reliable scales to measure endorsement of difficulty-as-importance and difficulty-as-impossibility. Second, it documents the predicted associations between each scale score and action, as well as supporting the

predicted effects of momentarily making difficulty-as-importance or difficulty-as-impossibility the more accessible inference. Third, while not directly addressing the consequences of experiencing contexts that unambiguously signal low odds or value from difficulty, research does document context-sensitivity and culture-based differences in the chronic accessibility of each difficulty mindset. It also reveals that manipulating context can shift momentary endorsement of difficulty mindsets, and that changing contexts might shift trait-level endorsement. However, evidence to date does not directly test the three core predictions of IBM theory we described in our opening paragraph (ecological validity, trait-like and state-like with consequences for self-perception and action, unambiguous contexts shift state endorsement); these tests remain to be done in our current studies.

Measuring Difficulty Mindsets: Construct Reliability and Validity

Fisher and Oyserman (2017) developed brief, reliable scales of each difficulty mindset (difficulty-as-importance Ex: "Sometimes if a task feels difficult to me, my gut says that it really matters for me"; difficulty-as-impossibility Ex: "Sometimes if a task feels difficult, my gut says it is impossible for me"). On average, people endorse difficulty-as-importance and reject difficulty-as-impossibility, scoring above the midpoint with scores skewed toward the upper range on the former and below the midpoint with scores skewed toward the lower range on the latter (for a review, Oyserman, 2024). The two are theoretically and empirically distinct. People's difficulty-as-importance scores do not predict their difficulty-as-impossibility scores– the confidence interval of the between-score correlation often includes zero, and correlations are sometimes positive, other times negative (Fisher & Oyserman, 2017; O'Donnell et al., 2023; Yan et al., 2024). Yan and colleagues (2024) documented configural and metric measurement invariance for each scale across eight countries, with each scale's items loading onto a single factor.

Because difficulty-as-impossibility focuses on odds of success and difficulty-as-importance focuses on value, scale scores generally have different patterns of association and distinct magnitudes of correlations with other measures relevant to self-regulation and task engagement. Researchers assessed the convergent and divergent validity of difficulty-as-importance and difficulty-as-impossibility with positive self-perceptions of control (locus of control, work self-efficacy), resilient character (grit, growth or fixed mindset, mental toughness), and goal formation (construal level, learning and performance goals, promotion and prevention focus; Fisher & Oyserman, 2017; Kiper et al., 2024). These studies document the expected pattern of correlations at levels well below the cutoff for redundancy (Kline, 2011). For example, locus of control, growth mindset, and prevention scores are not correlated with difficulty-as-importance scores and have small-to-moderate-sized correlations with difficulty-as-impossibility scores (Fisher & Oyserman, 2017).

Consequences for Self-Perception and Action

Associations with Endorsing Difficulty-as-Importance and Difficulty-as-Impossibility

Endorsing difficulty-as-impossibility is associated with preferring less effortful means of goal pursuit (controlling for difficulty-as-importance scores, Kiper et al., 2024). Endorsing difficulty-as-impossibility may also be associated with worse outcomes on tasks requiring persistence; it is weakly associated with lower end-of-term grades (in a study that did not report measuring difficulty-as-importance, Hernandez et al., 2021). In contrast, endorsing difficulty-as-importance does not predict preference for easier or harder means (when entered simultaneously with difficulty-as-impossibility scores, Kiper et al., 2024), but is associated with pursuing mastery-approach goals (Yan & Wang, 2021) and a preference for working with and finding oneself capable of solving complex number problems (i.e., using fractions and percentages, Mielicki et al., 2022).

Effect of Momentary Construct Accessibility

When difficulty-as-impossibility rather than difficulty-as-importance is on the mind, students are less likely to consider academic success as central to their identities (Smith & Oyserman, 2015), more likely to experience time as limited (Choi & Oyserman, 2024), and perceive difficult school tasks as more effortful (Oyserman et al., 2018). When the reverse is the case, students spend more time on school tasks (Smith & Oyserman, 2015), are more certain they will attain their school-focused possible identities (Aelenei et al., 2017), and believe they can find the time to work on important tasks (Choi & Oyserman, 2024).

The Ecology of Difficulty-as-Importance and Difficulty-as-Impossibility

Chronic Construct Accessibility

O'Donnell and colleagues (2023) explored chronic accessibility by examining free associations to words about difficulty, implicit associations between difficulty and importance or impossibility, and the extent to which people sorted definitions and synonyms of difficulty as being about importance or impossibility. Across methods, Americans associated difficulty more with impossibility. People in China and India did not show this bias.

Context Sensitivity of Construct Endorsements

Two lines of research test the effect of context on how much people endorse each scale. One tests the impact of changing beliefs about the college context, and the other line tests the impact of changing the context of the middle school classroom. The former manipulates how students perceive college and whether they focus on imagining their positive or negative possible identities, leading to shifts in difficulty-as-importance and difficulty-as-impossibility scores (Oyserman et al., 2015). The latter, middle school-based research changes the middle school context by providing students with an in-class, IBM-based program designed to support their identity-based motivation (Oyserman et al., 2006; Oyserman et al., 2021; Oyserman et al., 2025). These studies document that program receipt shifts students' difficulty-as-importance and

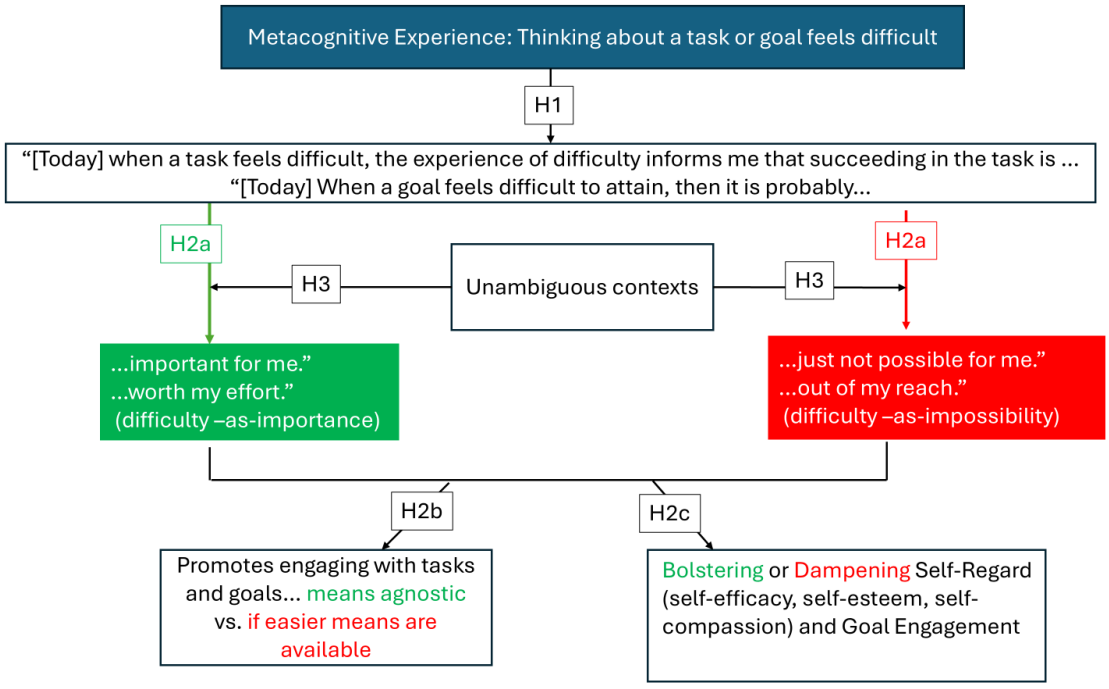
difficulty-as-impossibility endorsement scores.

Predictions

Figure 1 depicts the IBM process model, including the three core but not-yet-tested IBM theory predictions we test in the current paper. First, IBM predicts that people draw difficulty-as-importance and difficulty-as-impossibility inferences in their daily lives, but we found no studies measuring this. We predict H1: Ecological validity–People commonly infer difficulty-as-importance and difficulty-as-impossibility when they experience difficulty (Study 1). Second, IBM theory predicts that people chronically differ (trait-like) in difficulty-as-importance and difficulty-as-impossibility but that their endorsements are also context-sensitive (state-like). Yet, no studies measured their trait-like and state-like aspects or their consequences. We predict H2: Difficulty-as-importance and difficulty-as-impossibility endorsement scores have state-like and trait-like features, and both matter. Specifically, H2a: Endorsement scores vary between-person and within-person (Studies 2 and 4). H2b: Trait scores predict preferring and choosing ease over difficulty (Study 3). H2c: Trait and daily state scores are associated with daily fluctuations in self-perception and goal-focused action (Study 4). Third, IBM theory predicts that contexts shape how much people endorse difficulty-as-importance and difficulty-as-impossibility. Studies show context-sensitivity, but research has not directly examined specific features of contexts that shape endorsements. We predict H3: Unambiguous contexts matter–Difficulty-as-importance and difficulty-as-impossibility scores are context-sensitive (Study 5).

Figure 1

Process Model: People Infer Meaning from Metacognitive Experiences of Difficulty (H1). Difficulty Mindsets are Trait-like and State-like (H2a). They Shape Preference for Means (H2b), Self-Perception and Goal Engagement (H2c), and are Shaped by Unambiguous Contexts (H3)



Note: Green denotes difficulty-as-importance and its predicted effects; Red denotes difficulty-as-impossibility and its predicted effects.

Current Studies

We label correlation sizes with Ratner's (2009) rules of thumb: very small $r \leq 0.19$, small $0.2 \leq r \leq 0.39$, moderate $0.40 \leq r \leq 0.59$, large $0.6 \leq r \leq 0.79$, and very large $0.8 \leq r \leq 1$. For ease, before each study, we briefly summarize the predictions it tests. Next, we report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Transparency and Openness

The first author presented earlier analyses at two conferences in 2024 and 2025 (references withheld to preserve anonymity during the review process). No papers were published using these data. Appendix A provides all of our measures and response scales. OSF https://osf.io/s6ugv/?view_only=967bc089faf548d985c007125024fa6d provides open access to the supplemental materials, anonymized data, and R code for all studies; for the pre-registered

studies (Studies 3, 4c, and 5), we provide the pre-registrations and pre-registered analyses. In the current paper, we provide analyses that are powered given the collected sample sizes, reflecting simplification of study design and analyses. Following the template provided by Willroth and Atherton (2024), a full overview of any deviations from our initial pre-registrations and rationales is provided in Supplemental Materials Table S1.

We obtained IRB approval before collecting data (Studies 1, 3, 5 #UP-15-0055; Studies 4a to 4c #UP-19-00570). Study 2 was a secondary analysis of available data (Supplemental Materials, Study 2, Open ICSPR Links). All analyses were conducted using R statistical software (R Core Team, 2025). We calculated ICCs and their 95% confidence intervals using the ICC R package (v2.4.0; Wolak et al., 2012) with repeated measurements nested within persons to assess the within-person and between-person components of variability in endorsement (Studies 2, 4).

Power Analyses and Stop Rules for Data Collection

If we did not have prior data to estimate expected effect sizes and adequate sample sizes, our stop rule was the closing of the subject pool at the end of a semester (Study 1 Fall 2024; Study 4a Fall 2019; Study 4b Spring 2021) or the secondary data available to us (Study 2). In Study 3 (Fall 2022), 4c (Spring 2022), and Study 5 (Fall 2022 and Fall 2024), we conducted a priori power analyses with G*Power (Faul et al., 2007) to compute the required sample size given a power of .80, an alpha of .05, a two-tailed test, and either a small main effect ($f^2 = 0.04$, Study 3, Study 4c, difficulty-as-impossibility as the predictor) or a small interaction effect ($f^2 = 0.01$, Study 5, context by time interaction on difficulty-as-impossibility as the outcome). We chose estimated effect sizes using guidelines provided in the G*Power interface. The recommended sample size for Study 3 was 199 participants. For Study 5, the recommended sample size was $n = 246$ (82 people per condition); to be conservative, we planned to collect 100

participants per condition. This required running the study across two semesters and pooling the data to obtain our planned sample size. The recommended sample size for Study 4c was $n = 199$, more people than we could obtain for a diary study in any one semester. We addressed this by creating a sufficiently powered trait-level dataset (N = 260) by pooling Studies 4a, 4b, and 4c as Study 4. For day-level analyses, we are sufficiently powered to test day-level relationships for each study and above the recommended minimum of 100 level-2 observations (Maas & Hox, 2005).

Exclusions

We excluded scale responses from participants who missed over half the items on the scale. We had no further exclusion criteria for Studies 1 and 2. In Study 3, we excluded participants ($n = 5$) who did not follow instructions to add 10 puzzles to their set. In Study 4, per Nezlek (2012) and Meade and Craig (2012), we (1) excluded people who completed fewer than five daily reports, (2) kept only the first report on days with multiple completed reports, and (3) excluded daily reports that were either completed outside the time window or had failed attention checks (for details, see Supplemental Materials, Studies 4a-4c, Sample Exclusions). We retained 83.3% of daily reports ($n = 2{,}789$; $M = 11.45$ per person, $SD = 2.13$). In Study 5, we excluded people for five reasons: If they did not attempt any of the eight core puzzles ($n = 41$), averaged under five seconds spent on each puzzle ($n = 22$)[1], mistook the puzzle task for a mnemonics task ($n = 2$), gave nonsense responses ($n = 1$), or figured out the puzzles in the blocked condition were unsolvable ($n = 1$).

We examined data quality, identifying participants who gave identical numeric ratings

[1] We looked for responses that were too fast (M-2.5 SD) or too slow (M+2.5 SD) in their responses compared to the sample (between-person) means as outliers; none were found.

across all items within each difficulty mindset endorsement scale (i.e., straight-liners). Participants who straight-lined on each difficulty mindset scale were flagged. Straight-lining was uncommon (<10%) in most studies but common at the day-level in the diary responses (Study 1 n = 95, Study 2 n = 33, Study 3 n = 17, Study 4 n = 21 for trait responses and n = 1,082 for daily responses, Study 5 n = 12). As a data quality check, we re-ran each study's main analysis with and without straight-liners. Excluding straight-liners did not affect our results, so we report analyses using the full sample without straight-liner exclusions.

Samples

Undergraduates (Study 1 N = 986, Study 3 N = 216, Study 4 N = 260, Study 5 N = 551) participated for subject pool credit, except in Study 2, which was elementary school to high school aged students (N = 733) who participated at three time points (see Supplemental Materials for links to the open access datasets). In Studies 3 and 5, undergraduates participated at two points in the same semester. In Studies 4a to 4c, undergraduates completed a baseline survey and a 14-day daily diary study (n = 2,789 daily reports). Table 1 provides participant demographics by study for groups representing at least 10% in any study sample. Supplemental Materials Tables S4 and S5 provide study descriptive demographics for studies with pooled data (Study 2 and Study 4).

Table 1

Sample Sizes and Participant Demographics by Study

	Study 1	Study 2	Study 3	Study 4	Study 5
Sample Size	986	733	216	260	551
Age Mean	20.07	14.05	20.07	19.95	20.11
Age *SD*	1.90	1.57	1.89	2.05	2.03
% White	26.24	51.16	28.70	22.31	25.77
% Hispanic	16.71	26.06	15.28	10.38	13.97
% Asian	39.36	1.09	33.80	27.69	33.03
% Black	8.88	11.46	4.63	5.38	5.81

% Another Race-Ethnicity	6.44	10.10	17.59	26.54	20.87
% Male	33.01	46.66	33.33	25.00	30.13
% Female	66.26	53.34	65.74	60.00	68.97

Note. SD = standard deviation. Study 1 is a subset of the 1,227 students who signed up for the subject pool that semester; statistics reflect the overall subject pool sample. Study 2 demographics are from T1 data. Study 4 statistics are pooled across Studies 4a to 4c. Another Race-Ethnicity = The exact race-ethnicity options provided to participants varied by study; see Table S2 for details. Percentages do not add up to 100% due to missing data and variations in response data; Table S3 also provides demographics for groups making up <10% of any sample.

Descriptive Information on the Difficulty Mindset Scales

Across studies, as Table 2 details, difficulty mindset scales were reliable, functionally orthogonal, and differed in endorsement with people endorsing difficulty-as-importance (above the neutral midpoint) and rejecting difficulty-as-impossibility (below the midpoint).

Table 2

Difficulty-as-Importance and Difficulty-as-Impossibility Scale Means, Standard Deviations (SD), Cronbach's Alpha Reliability (α), Correlations, and Paired t-Test Results

Study	Measure	*n*	Mean (*SD*)	α	Correlation (*p*-value)	Paired *t*-test (*p*-value)
1	Difficulty-as-Importance	985	4.15 (0.83)	.81	-.03 (.352)	39.04 (<.001)
	Difficulty-as-Impossibility	985	2.53 (0.97)	.85		
2	Difficulty-as-Importance T1	733	3.37 (0.82)	.88	-.10 (.006)	19.21 (<.001)
	Difficulty-as-Impossibility T1	733	2.49 (0.84)	.85		
	Difficulty-as-Importance T2	660	3.17 (0.85)	.91	.07 (.054)	15.96 (<.001)
	Difficulty-as-Impossibility T2	660	2.47 (0.81)	.86		
	Difficulty-as-Importance T3	348	3.23 (0.74)	.89	.10 (.068)	11.44 (<.001)
	Difficulty-as-Impossibility T3	348	2.60 (0.78)	.88		
3	Difficulty-as-Importance	216	4.69 (0.93)	.69	-.03 (.640)	18.82 (<.001)
	Difficulty-as-Impossibility	216	2.67 (1.24)	.80		
4	Difficulty-as-Importance	260	4.28 (0.86)	.80	-.21 (<.001)	23.29 (<.001)
	Difficulty-as-Impossibility	260	2.33 (0.88)	.75		
	Difficulty-as-Importance (Day)	1980	4.13 (1.10)	.78	-.13 (<.001)	42.98 (<.001)
	Difficulty-as-Impossibility (Day)	1980	2.58 (1.05)	.77		
5	Difficulty-as-Importance T1	551	4.77 (0.94)	.67	.04 (.353)	30.69 (<.001)
	Difficulty-as-Impossibility T1	551	4.71 (1.09)	.78		
	Difficulty-as-Importance T2	551	2.76 (1.26)	.81	.08 (.048)	24.99 (<.001)
	Difficulty-as-Impossibility T2	551	2.93 (1.36)	.84		

Note. Study 4 is pooled across Studies 4a to 4c. Response options Study 2: 1 = strongly disagree, 5 = strongly agree; Studies 1 and 3-5: 1 = strongly disagree, 6 = strongly agree. Daily-measure reliabilities are computed using a three-level model approach with scale items nested within days and days within persons (Nezlek, 2017).

Study 1

Study 1 tests H1 (Ecological validity).

Method

Students filled out a questionnaire including mostly demographic questions requested by other researchers and, near the beginning of the questionnaire, the Fisher and Oyserman (2017) difficulty mindset scales with scale items appearing in the order listed next (items randomized within blocks). Block 1: Fisher and Oyserman's (2017) difficulty mindset scales (four-item difficulty-as-importance scale, Ex: "If a task feels difficult, my gut says that it really matters for me," and four-item difficulty-as-impossibility scale, Ex: "If a task feels difficult, my gut says that it may be impossible for me."). Block 2: single-item recall measures of inferring difficulty-as-importance and difficulty-as-impossibility.

Results and Discussion

Table S6 provides scale response options, sample size, reliability, means, standard deviations, and correlations among scales.

Supporting H1, students recalled experiencing both difficulty-as-importance and difficulty-as-impossibility about a few times a month (median = 7). Recall distributions were left-skewed (see Figure S1); most students recalled frequently experiencing each inference. As predicted, students recalled inferring importance and impossibility from their own experiences of difficulty when thinking about tasks and goals.

Study 2

Study 2 tests H2a (Scores vary between persons and fluctuate within persons).

Method

Students completed the 6-item difficulty-as-importance and difficulty-as-impossibility

endorsement scales from Oyserman and colleagues (2015) at three time points (T1 n = 733, T2 n = 660, T3 n = 348). Elapsed time was 1 to 37 weeks between T1 and T2 (Dataset 1 M = 4.73 weeks, SD = 2.29; Dataset 2 M = 33.83 weeks, SD = 0.93) and 2 to 56 weeks between T2 and T3 (Dataset 1 M = 18.19 weeks, SD = 9.36; Dataset 2 M = 39.72 weeks, SD = 10.89). Due to missing data, the T1 to T3 time lapse was larger, 6 to 90 weeks ($\geq$ one semester in Dataset 1, M = 21.57 weeks, SD = 10.11; $\geq$ one school year in Dataset 2, M = 73.20 weeks, SD = 10.54).

Results and Discussion

Descriptive Analyses

From T1 to T3, difficulty-as-impossibility scores declined (b = -0.02, t = -6.03, p < .001) and difficulty-as-impossibility scores increased (b = 0.01, t = 2.23, p = .026). Supplemental Materials (Study 2, Endorsement Across Time) provides multiple regression equations and detailed results.

Testing H2a

We tested H2a by calculating intraclass correlations (ICCs) and their 95% confidence intervals (CIs) with the three measurement occasions nested within students.[2] The ICCs and their CIs suggest that the scales vary meaningfully between (trait-like) and within (state-like) people (difficulty-as-importance ICC=.45, 95% CI [.40, .50]; difficulty-as-impossibility ICC=.42, 95% CI [.36, .47]). The overlapping CIs imply that the difficulty mindsets do not differ in their ICCs; we verified this with a Bayesian approach, estimating each null regression model with weakly informative priors, yielding difficulty-as-importance ICC=.45, 95% Credible Interval [.40, .50]; difficulty-as-impossibility ICC=.41, 95% Credible Interval [.36, .47]. We infer that difficulty-as-

[2] ICC, a descriptive statistic ranging from 0 to 1, represents the proportion of between-person to total variance. ICCs < .50 indicate that measurements across time are not fully stable, with more variance at the within-person than the between-person level.

importance and difficulty-as-impossibility scores have indistinguishable ICCs; they are equally trait-like and state-like. Follow-up exploratory analyses revealed that the ICCs for both scales were consistently < .50 across participants' T1 school level, implying no shift due to developmental or school-structural factors (Supplemental Materials Figure S2).

Study 3

Study 3 tested H2b (Trait scores predict preferring and choosing ease over difficulty).

Method

A pilot study (N = 102) confirmed that students found the solving word puzzles task engaging and valuable for developing skills for getting good grades (Supplemental Materials, Study 3, Pilot).

Students participated at two time points (*M* = 8.82 days, *SD* = 14.95 apart). At T1, they filled out a questionnaire including mostly demographic questions requested by other researchers, and, near the beginning of the questionnaire, the Fisher and Oyserman (2017) difficulty mindset scales with items appearing in randomized order. At T2, they read: "You will work on a set of 10 word-puzzles for this task. Working on word-puzzles is a useful way to develop the kinds of sharp analytic skills that help people get good grades in school. Working on word-puzzles is particularly useful for developing this grade-bolstering skill when the word-puzzles are **difficult**." They then reported their preferences: "I would prefer the puzzles most people can solve," and "I would prefer the puzzles most people cannot solve" (1 = not at all, 5 = very much), and set up their task: "Okay, put together a training set of 10 puzzles. How many of those 10 would you select from each kind of puzzle? How many would you include from the puzzles that most people **can** solve? How many would you include from the puzzles most people **cannot** solve?". Students then provided their gender, age, and race-ethnicity.

Results and Discussion

Descriptive Analyses

Students preferred (M = 3.54, SD = 1.10) easy puzzles, did not prefer (M = 2.95, SD = 1.18) difficult ones, and created puzzle sets with ~40% difficult puzzles and ~60% easy ones (difficult puzzles M =3.80, SD = 2.01). Students who preferred difficult puzzles put more in their set, $r(216) = .69$, $p < .001$; those preferring easy puzzles put fewer difficult ones in their set, $r(216) = -.56$, $p < .001$.

Testing H2b

Supporting H2b, linear multiple regressions predicting T2 preferences and choices from T1 difficulty-as-impossibility and difficulty-as-importance scores revealed that people scoring higher in difficulty-as-impossibility subsequently preferred easy puzzles (b = 0.20, t = 3.49, p < .001) and not difficult puzzles (b = -0.24, t = -3.89, $p < .001$), adding fewer difficult ones to their puzzle set (b = -0.35, t = -3.21, p = .002). Difficulty-as-importance scores did not shape later preferences (for easy puzzles, b = 0.13, t = 1.72, p = .087; for difficult puzzles, b = 0.05, t = 0.58, p = .566) or choice (adding difficult puzzles to their set, b = -0.13, t = -0.89, p = .379). As detailed in Supplemental Materials (Study 3, Follow-Up Time Lag Analysis), results were stable when we controlled for the number of days between T1 and T2. We infer that people have insight into the consequences of their chronic beliefs, with difficulty-as-impossibility endorsers choosing the less effortful means of task completion and difficulty-as-importance endorsers showing indifference to means.

Study 4

Study 4 tested H2a (Between- and within-person variability) and H2c (Trait and daily state scores are associated with daily fluctuations in self-perception and goal-focused action).

Method

Students completed a baseline questionnaire (T1) and a 14-day daily diary (T2 to T15). At T1, students completed the Fisher and Oyserman (2017) 4-item difficulty-as-importance and 4-item difficulty-as-impossibility mindset scales, 10-item goal self-efficacy scale (following Bandura, 2006), 10-item Rosenberg (1965) self-esteem scale, and a 6-item self-compassion scale (two items each from the over-identification, self-kindness, and self-judgment subscales; Raes et al., 2011) and then provided demographics (gender, age, and race-ethnicity). Next, they watched an introductory video explaining that they would receive a link each evening for 14 days and should complete each daily diary as close to bedtime as possible. In Study 4a, students had from 9 p.m. to 11 a.m. the next day to complete the daily link, following prior diary studies (e.g., Newman et al., 2020; Oishi et al., 2007). Given student feedback indicating that 9 p.m. was too late, we opened the link at 5 p.m. in Studies 4b and 4c and retained the 11 a.m. next day cut-off.

T2 to T15 were 14 consecutive days; students completed the daily diary. It included day-level versions of the measures administered at T1, adjusted to have fewer items to reduce burden (6-item goal self-efficacy scale, Nezlek (2005); 4-item self-esteem scale; 3-item self-compassion scale) and three diary-specific measures. The diary-specific measures were: (1) daily meaningful school engagement: “Today I did schoolwork the hard way (e.g., I took notes, I read the assignments before class;” and in Studies 4b and 4c, (2) daily experience of difficulty: “Did you experience difficulty working on a task today?” and (3) daily goal engagement: “Did you work on any of your goals today?”. Students saw the daily difficulty-as-importance and difficulty-as-impossibility items only on days they reported experiencing difficulty. They saw the daily goal self-efficacy items only on days they reported goal engagement.

Results and Discussion

Descriptive Analyses

Difficulty-as-importance and difficulty-as-impossibility scores were distributed across the full scale on most days and did not converge across the 14 days (see Supplemental Materials Figure S3). Daily self-esteem (α = .80), goal self-efficacy (α = .76), and self-compassion (α = .60) were reliable; Supplemental Materials Table S7 presents scale descriptive statistics overall and by study. We found significant, negative, small-to-moderate-sized correlations between trait and daily difficulty-as-impossibility and daily positive self-perceptions (self-esteem, goal self-efficacy, and self-compassion). These associations were smaller-sized and positive for daily and trait difficulty-as-importance (daily very-small-sized significant associations, trait small and not always significant at $p < .05$, see Supplemental Materials Table S8).

Most students (98.23%) experienced difficulty while working on a task, and worked on their goals (98.04%) at least once during the two weeks. They reported experiencing difficulty (Study 4b 48.33%, Study 4c 49.32%) and working on a goal (Study 4b 57.35%, Study 4c 65.68%) in about half of their daily reports. Experiencing difficulty and working on goals correlated ($r(1575) = 0.22$, $p < .001$), a small-sized correlation. Students reported meaningful engagement with school on 58.11% of days.

Testing H2a

Supporting H2a, difficulty-as-importance and difficulty-as-impossibility scores include trait-like and state-like aspects.[3] We calculated ICCs and their 95% CIs with daily scores nested

[3] We also explored possible age-related differences; while the ICC confidence intervals for difficulty-as-importance and difficulty-as-impossibility overlapped among the Study 2 younger participants, the confidence intervals did not overlap among undergraduates. Moreover, while the difficulty-as-impossibility ICC confidence intervals for younger (Study 2) and older (Study 4) participants overlap, they do not overlap for difficulty-as-importance. Taken together, results suggest that difficulty-as-importance may be more trait-like than difficulty-as-impossibility and become more trait-like in the undergraduate years compared to the middle and high school years.

within students (see Supplemental Materials Table S9 and Figure S4). Difficulty-as-importance score ICCs ranged from .51 to .62, pooled ICC = .59 (95% CI [.55, .64]) and difficulty-as-impossibility score ICCs ranged from .44 to .50, pooled ICC = .46 (95% CI [.41, .42]) across Studies 4a to 4c.

Testing H2c

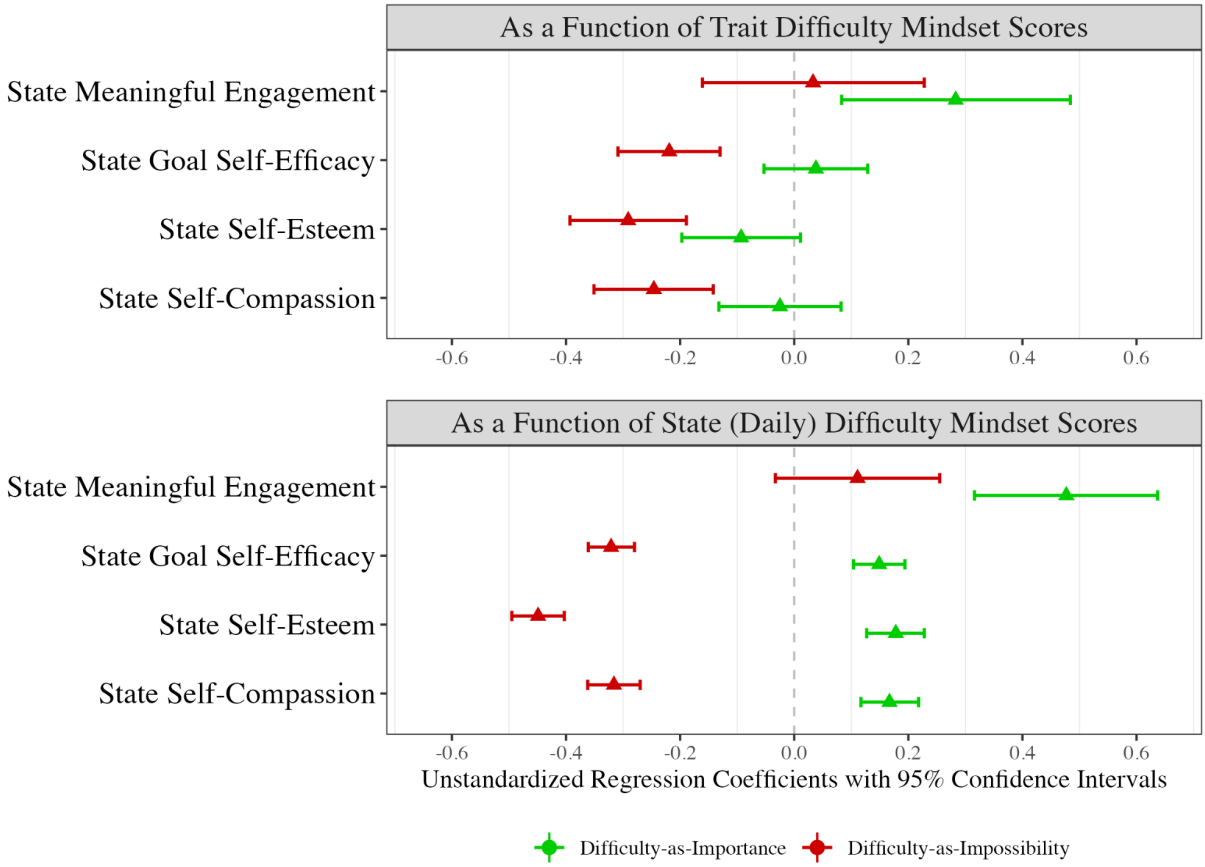
Supporting H2c, both trait and state difficulty-mindset scores mattered for positive self-perceptions and action, but with distinct patterns. We created two sets of two-level models (example equations in Appendix B) to examine the relative impact of trait and state difficulty-as-importance and difficulty-as-impossibility on daily task engagement and self-perception. In each model, both difficulty mindset scores were entered simultaneously so that the effect of each controlling for the other could be ascertained. In the first set of models, the level-2 predictor was the trait difficulty-as-importance or difficulty-as-impossibility score, and the outcome was daily meaningful school engagement, self-efficacy, self-esteem, or self-compassion. In the second set of models, the level-1 predictor was the group-mean-centered daily difficulty-as-impossibility or difficulty-as-importance score, and the outcome was daily meaningful school engagement, goal self-efficacy, self-esteem, or self-compassion. Appendix B details our rationale for this plan. We present analyses using the pooled dataset (see Supplemental Materials for by-study results).

As the top panel of Figure 4 details, controlling for study and simultaneously entering the trait scores, people higher in trait difficulty-as-importance were more likely to report engaging with school in a meaningful way on any given day (b = 0.28, z = 2.78, p = .005, R^2 = .04). This was not the case for trait difficulty-as-impossibility (b = 0.03, z = 0.34, p = .738); it was associated with less goal self-efficacy (b = -0.22, t = -4.77, p < .001, R^2 = .07), lower self-esteem (b = -0.29, t = -5.56, p < .001, R^2 = .06), and less self-compassion (b = -0.25, t = -4.59, p < .001,

R^2 = .04) on any given day. The parallel positive pattern for trait difficulty-as-importance was not significant (goal self-efficacy b = 0.04, t = 0.82, p = .416; self-esteem b = -0.09, t = -1.74, p = .083; self-compassion b = -0.03, t = -0.46, p = .647).

Figure 4

Associations Between Trait and State Difficulty-as-Importance and Difficulty-as-Impossibility, Daily Meaningful Engagement with School, and Daily Self-Perception



The bottom panel of Figure 4 depicts associations of daily difficulty-as-importance and difficulty-as-impossibility scores with each daily outcome variable, controlling for study and time (day of diary report) and simultaneously entering the daily endorsement scores. On days students endorsed difficulty-as-importance more, they engaged more meaningfully with school (b = -0.48, z = 5.82, p < .001, R^2 = .06), felt more efficacious (b = 0.15, t = 6.55, p < .001), had better self-esteem (b = 0.18, t = 6.88, p < .001), and were more self-compassionate (b = 0.17, t =

6.49, $p < .001$). In contrast, on days they endorsed difficulty-as-impossibility, they did not consistently engage meaningfully with school (b = 0.11, $z = 1.51$, $p = .130$), they felt less efficacious (b = -0.32, $t = -15.57$, $p < .001$, $R^2 = .08$), had worse self-esteem (b = -0.45, $t = -19.02$, $p < .001$, $R^2 = .11$), and were less self-compassionate (b = -0.32, $t = -13.42$, $p < .001$, $R^2 = .07$). Wald tests with unstandardized regression coefficients reveal that the daily difficulty-as-impossibility negative associations were significantly larger than the daily difficulty-as-importance positive ones with daily goal self-efficacy ($X^2 = 263.90$, $p < .001$), self-esteem ($X^2 = 368.29$, $p < .001$), and self-compassion ($X^2 = 220.02$, $p < .001$).

Study 5

Study 5 tested H3 (Unambiguous contexts matter).

Method

Students participated at two time points (M =13.42 days, SD = 20.30 apart). At T1, they filled out a questionnaire including mostly demographic questions requested by other researchers and, near the end of the questionnaire, the Fisher and Oyserman (2017) difficulty mindset scales with items appearing in randomized order. At T2, students worked on 16 word-puzzle anagrams, one per screen (Figure 2 depicts an example), completed the difficulty mindset scales again, and reported task judgments (“How easy or difficult was the word-puzzle task?” 1 = very easy, 7 = very difficult, "To me, these puzzles felt important to solve," "To me, these puzzles felt impossible to solve" 1 = strongly disagree, 6 = strongly agree), and their gender, age, race-ethnicity.[4]

Half of the word-puzzles were a core set of eight moderately difficult, single-solution puzzles (Gilhooly & Johnson, 1978); the other eight puzzles depended on randomization to one

[4] We also asked students to provide their verbal SAT/ACT percentiles, but most could not recall.

of three sets. Each set provided a hint of the odds of success (good odds, low odds, no chance). In the good odds context, the core set was mixed with a set of easier-to-solve, multiple-solution puzzles (EnchantedLearning.com, 2019). In the low odds context, the core set was mixed with a set of moderately difficult, single-solution puzzles (Gilhooly & Johnson, 1978). In the no chance of success context, the core set was mixed with a set of unsolvable puzzles (Calef et al., 1992).

Figure 2

Example Word-Puzzle Screen: Participants Type in Their Solution or Press "I can't figure it out"

Note: All of the word-puzzles are located in Supplemental Materials Table S10.

Results and Discussion

Manipulation Checks

Our manipulation checks suggested successful context manipulation in three ways. First, students found the puzzle task important ($M = 4.02$, $SD = 1.72$), regardless of random assignment (for scores, see Supplemental Materials, Study 5, Subjective Importance). Second, random assignment shifted how impossible the task felt. It felt more impossible to students randomized to the no chance ($M = 4.06$, $SD = 1.72$) compared to those in the low ($M = 3.00$, $SD = 1.69$, $t(548) = 6.08$, $p < .001$) or good ($M = 2.59$, $SD = 1.61$, $t(548) = 8.43$, $p < .001$) odds of success contexts; the task felt more impossible to those in the low compared to the good odds of success context, $t(548) = 2.38$, $p = .047$. Third, random assignment shifted how difficult the task felt.

Students randomized to the no chance of success context (M = 5.39, SD = 0.92) rated the task as harder than those randomized to the low (M = 4.68, SD = 1.28, t(548) = 5.54, p < .001) or good (M = 4.17, SD = 1.42, t(548) = 9.54, p < .001) odds contexts. Those randomized to the low odds context found it harder than those randomized to the good odds one, t(548) = 4.04, p = .002.

Testing H3

We tested H3 with two repeated-measures ANCOVAs with time as a within-subjects factor and context as a between-subjects factor predicting difficulty-as-importance or difficulty-as-impossibility. Our predictors were context, time, and the context by time interaction; the other difficulty mindset score and the semester of data collection served as controls. Though not significant at a p < .05 threshold, the predicted interaction between context and time was marginally significant in each ANCOVA, difficulty-as-impossibility (F(2, 548.76) = 2.28, p = .104, f= 0.08)[5] and difficulty-as-importance (F(2, 548.71) = 2.87, p = .058, f= 0.09).[6] Given this, we conducted pairwise comparisons to examine the effect of time on difficulty mindset endorsement in each context.

As depicted in Figure 3, students randomly assigned to experience the difficult task in a context signaling no chance of success subsequently endorsed difficulty-as-impossibility more (t(551) = -3.81, p < .001) and difficulty-as-importance less (t(553) = 2.92, p = .004). We did not find a significant change in either difficulty mindset scale score among those randomly assigned to the good (difficulty-as-impossibility t(547) = -0.93, p = .352; difficulty-as-importance t(548) =

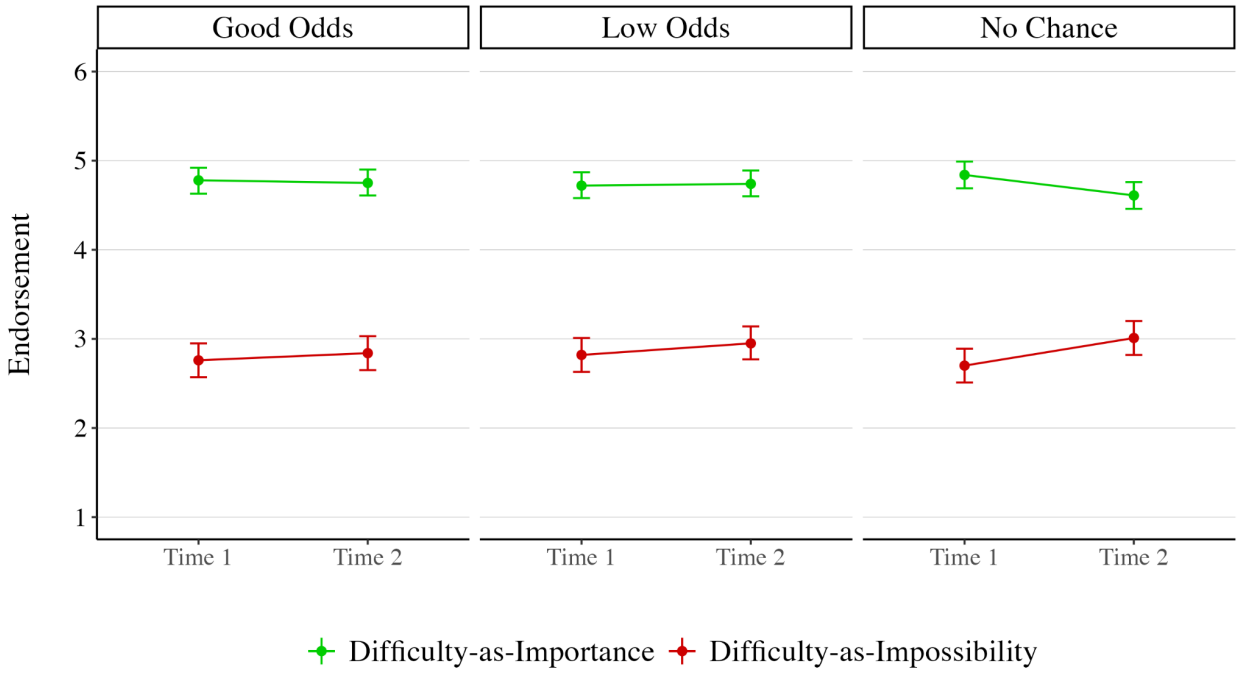
[5] Context F(2, 546.89) = 0.25, p = .781, f = 0.03; difficulty-as-importance F(1, 1013.51) = 4.78, p = .029, f = 0.07; semester F(1, 546.95) = 5.38, p = .021, f = 0.09; and time F(1, 548.7) = 13.97, p < .001, f = 0.14.

[6] Context F(2, 546.64) = 0.12, p = .884, f = 0.02; time (F(1, 553.83) = 3.03, p = .082, f = 0.06; semester F(1, 549.05) = 0.10, p = .750, f = 0.02; difficulty-as-impossibility F(1, 1013.60) = 4.72, p = .030, f = 0.07.

0.31, p = .756) or low odds (difficulty-as-impossibility $t(547)$ = -1.71, p = .089; difficulty-as-importance $t(549)$ = -0.23, p = .817) contexts. We infer that if a context provides a strong, unambiguous signal that success cannot be attained, people's endorsement of difficulty-as-importance is undermined, and their endorsement of difficulty-as-impossibility is bolstered. In more ambiguous contexts, endorsements remain relatively stable.

Figure 3

Difficulty-as-Impossibility and Difficulty-as-Importance Endorsements are Sensitive to Contexts Signaling No Chance of Success, Not Otherwise



General Discussion

We tested and found support for three predictions core to IBM theory (ecological validity, trait-like and state-like with consequences for self-perception and action, and unambiguous contexts matter) across five studies with about 2,000 college students and 700 middle and high school students. College students recall inferring difficulty-as-importance and difficulty-as-impossibility a few times a month on average in their everyday lives (Study 1). College, middle, and high school students endorse difficulty-as-importance more than difficulty-

as-impossibility (Studies 1 to 5). Both difficulty-as-importance and difficulty-as-impossibility have trait-like and context-sensitive (state-like) features (Studies 2 to 5), though difficulty-as-importance beliefs may be somewhat more trait-like (Study 4). Whether measured at the trait or daily level, the two scores are functionally independent, such that knowing one score is not a good indicator of the other (Studies 1 to 5). On days when people were higher than their average on difficulty-as-importance, they reported more meaningful engagement with schoolwork, and more self-compassion, goal self-efficacy, and self-esteem. On days they scored higher than their average on difficulty-as-impossibility, they reported less self-compassion, goal self-efficacy, and self-esteem. Trait difficulty-as-impossibility scores were also associated with daily fluctuations in these measures of self-perception, while trait difficulty-as-importance beliefs were associated with more daily meaningful engagement with schoolwork. Strong contextual cues signaling that success is blocked momentarily shift endorsements of both difficulty mindset scale scores (Study 5).

Theoretical Contributions

As outlined next, our results contribute not only to the literature on identity-based motivation theory but also to research on self-esteem, self-compassion, and goal self-efficacy. First, as highlighted in our introduction, our results address gaps in extant IBM research. We use previously validated measures to test the prediction that people infer difficulty-as-importance and difficulty-as-impossibility when they experience difficulty in their everyday lives. We use previously validated measures to support the prediction that difficulty-as-importance and difficulty-as-impossibility have trait-like and state-like features and that both matter. We build on prior research, manipulating context to document that unambiguous contexts shift momentary endorsement of both mindsets.

Second, we document that both mindsets include meaningful amounts of between and within-person variance. While benchmarks for what qualifies as a meaningful amount of within-person variation have not been established, we infer that difficulty mindsets reflect both trait-like between-person differences and state-like within-person variability for two reasons. First, the ICCs we found suggest that scores vary about equally between and within persons. Second, a meta-analytic review of the ICCs of applied psychological constructs (e.g., affect, stress, ego depletion, work engagement) by Podsakoff and colleagues (2019) found that ICCs vary greatly, ranging from 11% to 99%, with an average ICC of 48%. Difficulty-as-importance and difficulty-as-impossibility ICCs are close to this average.

Moreover, our studies contribute to the broader literature on self-perceptions in two ways. First, we show a unique pattern of relationship between endorsing each difficulty mindset and daily fluctuations in positive self-perceptions. Using multilevel modeling, we unpack the unique association between the trait-level and state-level endorsements of both difficulty mindsets and state self-efficacy, self-esteem, and self-compassion. In particular, we show that the negative power of endorsing difficulty-as-impossibility on these aspects of positive self-perception is stronger than the positive power of endorsing difficulty-as-importance, whether predicting daily fluctuations in these measures from trait difficulty mindset scores or examining daily fluctuations in each. Second, as documented in Supplemental Materials (Tables S6, S8), both trait difficulty mindset scores are distinct from trait positive self-perception, including self-efficacy, self-esteem, and self-compassion (correlations range from very small to moderate in size).

Limitations and Future Directions

As is the case for any set of studies, ours has limitations that might be addressed in future research. We consider limitations to generalizability given our samples, measures, and methods.

First, regarding samples, while our student samples were diverse, ranging from middle and high school to college-aged and included both females and males, and varied in race-ethnicity, they all lived in the United States, which may limit generalizability across societies and developmental phases. Since opportunities generally decrease and constraints on resources increase with age (motivational theory of life-span development, Heckhausen et al., 2010), difficulty-as-impossibility endorsement may become more trait-like as people age. Future research could evaluate the stability of our results by utilizing longitudinal survey designs, non-student samples, and samples outside of the U.S.

Second, regarding measures, we operationalized contexts, tasks, and goals relevant to our student samples. Beyond school attainment and engagement, future studies could focus on other meaningful goals, from political engagement to financial saving to parenting, that fit different life phases or domains. For example, people who believe pro-environmental action is important and worthwhile may still fail to take even low-effort actions, such as recycling, if they believe their actions are unlikely to meaningfully contribute to the end goal of climate mitigation. Moreover, barriers to pro-environmental action may trigger increases in difficulty-as-impossibility endorsement and subsequently lower feelings of efficacy. In contrast, contexts that unambiguously cue the importance of environmental action may increase people's endorsement of a difficulty-as-importance mindset, bolstering their willingness to act.

Third, regarding methods, we used various methodological approaches–a scenario study, experiments, secondary analysis of survey data, and daily diaries–to address gaps in research to date. Future studies could replicate each using a different method to increase robustness. Of particular note, Study 4 documents up and down fluctuations in daily endorsements of difficulty-as-importance and impossibility, but Study 5 only documents one antecedent of decreased

difficulty-as-importance and increased difficulty-as-impossibility endorsement (a context that unambiguously suggests no odds of success). Future experiments could examine features of contexts that increase difficulty-as-importance and decrease difficulty-as-impossibility endorsement. For example, by unambiguously cuing the importance of engagement. Additionally, in Study 5, we focused attention on odds of success, which is central to difficulty-as-impossibility. Future research could create contexts in which the value of success, which is central to difficulty-as-importance, is unambiguous to test the possibility that such contexts would shift up difficulty-as-importance and shift down difficulty-as-impossibility endorsement.

Practical Implications

We document that people draw both difficulty-as-importance and difficulty-as-impossibility inferences in their everyday lives, that these inferences are both parts of who they are (trait-like) and fluctuate (state-like), and that both matter for how they experience themselves and what they do. At the same time, we also show that difficulty-as-importance may be or become more trait-like (as reflected in college students compared to younger participants), implying that people low in difficulty-as-importance may benefit from programs supporting the adoption of a more chronic difficulty-as-importance perspective. Second, that difficulty-as-impossibility may be both more state-like and also, when endorsed, more undermining of positive goal self-efficacy, self-esteem, and self-compassion. To the extent that each of these aspects of self-perception is promotive of resilience, people may benefit from contexts that reduce the salience of a difficulty-as-impossibility perspective. Schools and workplaces that create such contexts would not only benefit their students and workers, but may also benefit by having students and workers who more persistently engage.

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APPENDIX A: MEASURES

All response scales are 1=strongly disagree to 6=strongly agree, except for Study 2. Study 2 response scales are 1=strongly disagree to 5=strongly agree.

Difficulty-as-Importance Scale

Studies 1, 3, 4, and 5 Trait Measure (Fisher & Oyserman, 2017)

1. If a task feels difficult, my gut says that it really matters for me.
2. I know a goal is a key one for me when it feels difficult to work on.
3. When a goal feels difficult to attain, then it is probably worth my effort.
4. When a task feels difficult, the experience of difficulty informs me that succeeding in the task is important for me.

Study 2 Trait Measure (Oyserman, Destin, & Novin, 2015)

1. If I'm working on a task that feels difficult, it means that the task is important.
2. A sign that a task is important to me is how difficult it feels while working on it. If it feels difficult, it's important.
3. If a task is difficult, it is probably important for me to do well at it.
4. Struggling to complete a task reminds me that the task is important.
5. Tasks that feel difficult are important tasks.
6. If a task is difficult, it means that it's important for me.

Study 4 Daily Measure, Study-Created

1. Today when I experienced difficulty on a task, my gut said that it really mattered for me.
2. Today when a goal was difficult to attain, I knew that the goal was a key one to work on.
3. Today when a goal was difficult to attain, I felt that it was worth my effort.
4. Today when I experienced difficulty on a task, I felt that it was important for me.

Difficulty-as-Impossibility Scale

Studies 1, 3, 4, and 5 Trait Measure (Fisher & Oyserman, 2017)

1. If a task feels difficult, my gut says that it may be impossible for me.
2. I know a goal is impossible for me when it feels difficult to work on.
3. When a goal feels difficult to attain, then it is probably out of my reach.
4. When a task feels difficult, the experience of difficulty informs me that succeeding in the task is just not possible for me.

Study 2 Trait Measure (Oyserman, Destin, & Novin, 2015)

1. If I feel stuck on a task, it's a sign that my effort is better spent elsewhere.
2. If working on a task feels very difficult, that type of task may not be possible for me.
3. If a task feels too difficult, I should move on to something else.
4. When working on a task feels hard, that feeling means it's not for me.
5. Finding a task really difficult tells me that I can't complete that task.
6. If a task feels really difficult, it may not be possible for me.

Study 4 Daily Measure, Study-Created

1. Today when I experienced difficulty on a task, my gut said that it might be impossible for me.
2. Today when a goal was difficult to attain, I knew that the goal was impossible for me.
3. Today when a goal was difficult to attain, I felt that it was out of my reach.
4. Today when I experienced difficulty on a task, I felt that succeeding at it was just not possible for me.

Autobiographical Recall: Difficulty-as-Importance and Difficulty-as-Impossibility

Study 1, Study-Created

How often would you say you have this experience in your own life?

1. Once or twice in my life
2. About once every few years
3. Once a year
4. About twice a year
5. About once every few months
6. Once a month
7. About a few times a month
8. Once a week
9. About a few times a week
10. Once a day
11. More than once a day

Positive Self-Perception Measures

Supplemental Materials provides trait-level self-perception measures and their correlations with the difficulty mindset measures (exploratory analyses).

Goal Self-Efficacy Scale

Study 4 Daily Measure, per Bandura (2006) created to target study issues

1. Today when I needed to take actions to work on my goals, I could do that.
2. Today, I was capable of coming up with strategies to make progress on my goals.
3. Today when I tried to implement the strategies I came up with, I could not. (R)
4. Today, I was not sure how to turn my goals into concrete actions. (R)
5. Today, I didn't know how to make progress on the goals I have for myself. (R)
6. Today when I needed to start working on a new goal, I had trouble getting started. (R)
7. Today when I encountered an obstacle while working on a goal, I had trouble keeping going. (R)

Self-Esteem

Study 4 Daily Measures, Nezlek (2005)

1. Today, I felt like a failure. (R)
2. Today, I felt I had many good qualities.
3. Today, I thought I was no good at all. (R)
4. Today, I was satisfied with myself on the whole.

Self-Compassion

Study 4 Daily Measure, Study-Created (One item per self-compassion self-kindness, over-identification, and self-judgment subscales; adapted from Raes and colleagues, 2011)

1. Today, I felt compassion toward myself.
2. Today I showed caring, understanding, and kindness toward myself.
3. Today I was disapproving and judgmental about my own flaws and inadequacies. (R)

APPENDIX B: STUDY 4 MULTILEVEL ANALYSIS

Rationale and Explanation

By group-mean centering daily predictor variables, we center scores on each person's 14-day average, removing variance attributable to between-person factors (e.g., response tendencies, individual differences; Hoffman, 2015, Chapter 9). The resulting interpretation focuses on how a person deviates from their own day-to-day average (Enders & Tofighi, 2007). For reporting effect sizes, we follow Rights and Sterba (2019) and report R^2 effect sizes calculated using model-implied variances. Specifically, we report the proportion of total outcome variance explained by all predictors via fixed slopes. As recommended by Nezlek (2012) and Kreft and de Leeuw (1998), we do not report R^2 separately for level 1 and level 2.

General Equation Notation

The subscript i is for the repeated measurements of each person ($i = 1 \ldots nj$) and the subscript j is for the persons ($j = 1 \ldots J$). e_{ij} is the residual error term at the repeated measurements level (Level 1) and u_{0j} is the residual error term at the person level (Level 2). y_{00} is the grand mean for the outcome variable score.

Equation 1: Trait Difficulty Mindset Endorsements Predicting Daily School Engagement

Level-2 predictor variables: trait difficulty-as-importance, trait difficulty-as-impossibility, study 4b dummy variable, and study 4c dummy variable

Level-1 outcome variable: daily meaningful schoolwork engagement

$$(outcome\ variable)_{ij} = \pi_{ij}\ ;\ \pi \sim \text{Binomial}\ (\mu)$$

$$\pi_{ij} = \text{logistic}(\eta_{ij})$$

$$\eta_{ij} = y_{00} + y_{01}(trait\ difficulty\text{-}as\text{-}importance\ endorsement)_j + y_{02}(trait\ difficulty\text{-}as\text{-}impossibility\ endorsement)_j + y_{03}(study4bdummy)_j + y_{04}(study4cdummy)_j + u_{0j}$$

Equation 2: Trait Difficulty Mindset Endorsements Predicting Daily Self-Perceptions

Level-2 predictor variables: trait difficulty-as-impossibility, trait difficulty-as-importance, study 4b dummy variable, and study 4c dummy variable

Level-1 outcome variable: daily goal self-efficacy, daily self-esteem, or daily self-compassion

$$(outcome\ variable)_{ij} = y_{00} + y_{01}(trait\ difficulty\text{-}as\text{-}importance\ endorsement)_j + y_{02}(trait\ difficulty\text{-}as\text{-}impossibility\ endorsement)_j + y_{03}(study4bdummy)_j + y_{04}(study4cdummy)_j + u_{0j} + e_{ij}$$

Equation 3: Daily Difficulty Mindset Endorsements Predicting Daily School Engagement

Level-1 predictor variables: group-mean centered daily difficulty-as-importance, group-mean centered daily difficulty-as-impossibility, and time (day of diary report), study 4b dummy variable, and study 4c dummy variable

Level-1 outcome variable: daily meaningful schoolwork engagement

$$(outcome\ variable)_{ij} = \pi_{ij}\ ;\ \pi \sim \text{Binomial}\ (\mu)$$

$$\pi_{ij} = \text{logistic}(\eta_{ij})$$

$$\eta_{ij} = y_{00} + y_{10}(daily\ difficulty\text{-}as\text{-}importance\ endorsement)_{ij} + y_{20}(daily\ difficulty\text{-}as\text{-}importance\ endorsement)_{ij} + y_{30}(time)_{ij} + u_{0j}$$

Equation 4: Daily Difficulty Mindset Endorsements Predicting Daily Self-Perceptions

Level-1 predictor variables: group-mean centered daily difficulty-as-impossibility, group-mean centered daily difficulty-as-importance, and time (day of diary report), study 4b dummy variable, and study 4c dummy variable

Level-1 outcome variable: daily goal self-efficacy, daily self-esteem, or daily self-compassion

$$(\textit{outcome variable})_{ij} = y_{00} + y_{10}(\textit{daily difficulty-as-importance endorsement})_{ij} + y_{20}(\textit{daily difficulty-as-importance endorsement})_{ij} + y_{30}(\textit{time})_{ij} + u_{0j} + e_{ij}$$