

Two Steps Forward, One Step Back: How Progress Steadiness Affects Motivation

by

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Defense Date: March 27, 2024

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Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor
of Philosophy in the Department Business Administration in The Graduate School of
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ABSTRACT

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Abstract

Rarely does the path to goal accomplishment look perfect. Making progress on everyday goals is often unsteady, in that each unit of effort or time spent generates unequal results. In this research, we examine how progress steadiness affects motivation. Although unsteady goal progress is common, we suggest that goal pursuers find it discouraging. We hypothesize that even when goal progress is equal in amount and speed, unsteady (vs. steady) progress decreases people's sense of accomplishment and motivation to continue, and increases quitting. Across a variety of goal domains, findings from vignette experiments (Studies 1a, 1b, and 5), a recall study (Study 2), and real-time experiments (Studies 3 and 4) support these hypotheses. We also explore the mediating role of self-efficacy (Study 3), and identify how manipulations targeting expectations about progress steadiness can reduce the negative effects of unsteady progress (Study 5). These results are the first to consider how progress steadiness can affect motivation.

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1. Introduction

Goal progress tends to ebb and flow. Imagine that Dan has the goal of reading 12 books by the end of the year. In January, his book is a page-turner with a sequel, so he reads two, but then in February, his whole family comes down with the flu, and he can't find time to read anything. In March, he gets back on track, but April is a dry spell, when work piles up and he is too tired to focus. May and June bring time outdoors, reading in the sunshine. By mid-year, he has read six books, so he is on track to meet his goal. As Dan experiences these fits and starts in his goal progress, how do they affect his motivation for the fall and winter? How would his motivation compare with Emma's, who steadily read one book per month?

Research has shown that motivation is shaped by the amount and speed of goal progress (Carver & Scheier, 1990, 1998; Hull, 1934; Kivetz et al., 2006; Liberman & Förster, 2008). In this work, we look at a new research question: We ask how the steadiness of progress affects motivation. We test the hypothesis that unsteady (vs. steady) progress reduces motivation, and we explore the mechanisms of this effect. In brief, we theorize that because people expect steady progress, when they instead experience unsteady progress, they feel less confident about goal outcomes, and thus, less motivated to persist. Because goal progress in everyday life is often unsteady, this phenomenon may contribute to our understanding of why people find it hard to stick to long-term goals.

1.1 Past Research on Goal Progress and Motivation

A large body of research has studied how the amount and speed of goal progress affects motivation. In their classic writings on control theory, Carver and Scheier (Carver & Scheier, 1990, 1998) predicted that when discrepancies occur between people's internal standards and the reality of how much progress they have made or how quickly they have made progress, they feel

demotivated (Brunstein, 1993; Chang et al., 2009; Johnson et al., 2013). In rats and humans alike, high levels of progress tend to produce greater motivation than low levels of progress (Hull, 1932, 1934; Kivetz et al., 2006; Lewin, 1951; Liberman & Förster, 2008; Nunes & Drèze, 2006; c.f. Fishbach & Dhar, 2005; Huang & Zhang, 2011). For example, people who participated in a coffee rewards program accelerated their coffee purchases when they had made a lot (vs. a little) progress towards their goal of earning a free coffee (Kivetz et al., 2006). Other findings show that the motivational effects of progress level are more curvilinear: Goal pursuers can get “stuck in the middle,” feeling unmotivated when they are halfway to the end state (Bonezzi et al., 2011; Touré-Tillery & Fishbach, 2012).

Attention to the amount of progress completed versus ahead also affects motivation (Fishbach et al., 2009, 2011, 2014; Koo & Fishbach, 2010, 2012, 2014). For instance, at the start of goal pursuit, people are more motivated when they pay attention to the 20% of progress already completed, rather than the 80% of progress still remaining. Towards the end of pursuit, in contrast, people are more motivated when they pay attention to the 20% of progress remaining rather than the 80% they have already completed (Koo & Fishbach, 2012). Attributions about the amount of progress also affect motivation: When the level of progress is low and people attribute it to themselves (vs. the situation), they infer that the goal is difficult to attain and thus are less motivated (Zhang & Huang, 2010).

Speed of progress also affects motivation. Faster progress tends to motivate more positive emotions and persistence (Chang et al., 2009; Johnson et al., 2013; Lawrence et al., 2002; Wilt et al., 2017). However, fast progress can also decrease effort due to “coasting” effects (Carver & Scheier, 1998; Cervone et al., 1994; Gollwitzer & Rohloff, 1999). This conflicting pattern is moderated by the stage of pursuit: When individuals are in the early stages of goal pursuit, they

are more motivated when progress is rapid rather than slow (Huang & Zhang, 2011). Rapid progress signals to individuals that they are likely to attain the goal, and thus, leads to greater motivation. In later stages, slow progress highlights to individuals that they still need to expend effort, and thus, leads to greater motivation.

In sum, research has explored both speed and amount of progress as predictors of motivation. To the best of our knowledge, no research has yet examined the type of progress – that is, its trajectory or pattern – and its effects on motivation. In this paper, we investigate how progress steadiness can affect goal pursuers’ subsequent motivation, independent of overall amount or speed of progress.

1.2 Expecting Progress Steadiness

Goal progress can be steady, in that each unit of effort or time spent leads to the same amount of progress, or unsteady, in that each unit of effort or time spent generates unequal results. As accomplishing goals requires persistence over time, through obstacles, and despite temptations (Brandstätter & Bernecker, 2022; Carver & Scheier, 1998; Fishbach & Shah, 2006), progress unsteadiness is common (Crocker et al., 2006; Heatherton et al., 1991). For example, one day, a researcher writes ten pages on a paper; the next, they delete three pages and write one. Similarly, a dieter loses two pounds one week and zero the next, and a person saving for a vacation saves 5% of their income one month and overspends by 2% the next. Although this type of unsteady progress is common, where people stall, reverse, or backslide in their progress, we suggest that most goal pursuers do not expect it and react negatively to it.

Why might people expect steady progress? First, such inaccurate expectations may reflect the difficulty of forecasting future obstacles or experiences in goal pursuit (Buehler & Griffin, 2003; Newby-Clark et al., 2000): It may simply be easier to assume a perfect relationship

between action and outcome than it would be to accurately guess when and what will happen. Second, in Western cultures, these expectations about progress may emerge from a sociocultural focus on meritocracy and the protestant work ethic, captured in phrases like “slow and steady wins the race” (Bejan, 2018; Franke-Ruta, 2013; Furnham, 1984; Marger, 2008; Rothman, 2005; Sankey, 2019; Tariq, 2022). Third, although it may ultimately be maladaptive to expect steady goal progress (see next section), the tendency to do so may reflect people’s motivated bias to see order and predictability in the world (Gray, 2004; Kay et al., 2015; Landau et al., 2015; Rutjens et al., 2010, 2013; Whitson & Galinsky, 2008).

Because we theorize that people’s expectations of steady progress may play a role in the effects we explore in this work, we first sought to empirically test our assumption that people do indeed expect steadiness, via extensive piloting (reported in the supplemental studies). We began with a pilot study asking participants to report their expected progress steadiness in weight loss, savings, reading, and work goals. As expected, participants indicated they would expect their progress to be more steady than unsteady (see Pilot Study 1 in the supplemental studies). We next ran a pilot study asking participants to evaluate how they viewed making unsteady progress across these domains. As expected, participants reported seeing unsteady (vs. steady) progress as more negative (see Pilot Study 2 in the supplemental studies). Finally, we sought to test our assumption that people actually do make unsteady progress on their real-life goals, and to see how predictions of progress compared to the reality. We compared one group’s actual progress steadiness on their most important goals over four months to another group’s expectations of the same. As expected, actual progress was indeed more variable than expected progress (see Pilot Study 3 in the supplemental studies).

With this assumption tentatively supported, we then turned to the major research questions underlying this work: How do goal pursuers respond to unsteady progress, and what drives those responses?

1.3 Progress Steadiness, Self-Efficacy, and Motivation

We theorize that progress unsteadiness has a negative effect on motivation because it reduces goal pursuers' perception that they can control their outcomes and will ultimately attain their goal. Self-efficacy, a person's belief in their ability to successfully pursue their important goals (Bandura, 1977, 1986), is crucial for motivation: When people do not feel that they can reliably control their outcomes via their actions, they feel unmotivated and quit more often (Bandura, 1991; Schunk, 1991; Schunk & Pajares, 2005). The importance of self-efficacy for motivation has been demonstrated across diverse goal domains, including sports (Blecharz et al., 2015; Martin & Gill, 1991), health (Brawley et al., 2003; Slovinec D'Angelo et al., 2014), and work (Cherian & Jacob, 2013; Consiglio et al., 2016).

We theorize that steady progress towards one's goals – saving the same amount of money each month or writing the same amount of code per hour – should allow people to feel more in control over these important goal outcomes. When progress is steady, their outcomes – money in the bank or code completed – predictably result from their actions. In contrast, when people experience unsteady progress, we theorize that this threatens their sense that they are reliably in control of their outcomes. Sometimes, an action or unit of time leads to the expected outcome, sometimes it fails to do so, and sometimes it leads to outcomes better than expected (Gecas & Schwalbe, 1983). We theorize that this inconsistent relationship between action and outcomes should reduce people's confidence about their future ability to achieve the goal, even if overall, the goal is progressing equally in terms of speed and amount. Goal pursuers may question if they

really understand how to achieve this goal, or begin to have more pessimistic expectations about the likelihood of attainment.

These hypotheses also build on literature demonstrating the negative affective consequences of uncertainty and randomness (e.g., Janoff-Bulman, 1992; Pennebaker & Stone, 2004). People tend to dislike and avoid unpredictable and disorderly experiences (Kay et al., 2008, 2009; Landau et al., 2004, 2006). Given this, when people experience unsteady goal outcomes, we theorized that this should be frustrating and threatening, and lead to reduced motivation and more goal disengagement.

1.4 Mitigating the Motivational Damage: The Unsteady Expectations (UE) Mindset

So far, we have hypothesized that goal pursuers are demotivated after experiencing unsteady progress, and that this reduction in motivation is driven by a reduction in self-efficacy. Given that everyday goal pursuit is not always smooth sailing but frequently a bumpy ride (Leduc-Cummings et al., 2022; also see Pilot 3 reported in the supplemental studies), we expect this process to occur quite often in everyday goal pursuit. If so, people's expectations about progress steadiness could help explain the high rates of failure observed across most common goal domains, such as health and savings goals (Marlatt & Kaplan, 1972; Norcross & Vangarelli, 1988; Rogers et al., 2015; Webb & Sheeran, 2006).

If our hypothesis about the role of expectations is correct, then manipulating expectations of steadiness may offer one route to mitigating these negative effects. We theorized that leading goal pursuers to believe that making unsteady progress is normal and desirable could attenuate the motivational harm they experience. To investigate this possibility, we drew on the mindset literature (Dweck, 1999, 2007; Dweck & Leggett, 1988). Considerable empirical evidence

suggests that mindset-based interventions can improve motivation (Dweck & Yeager, 2019; O’Keefe et al., 2023; Yeager & Dweck, 2020). Changing people’s beliefs about other aspects of goal pursuit has also yielded successful outcomes. For example, reappraising nervousness as excitement increases performance (Brooks, 2014) and reconstruing discomfort as a signal of growth increases motivation (Woolley & Fishbach, 2022).

Building on this research, we created a new mindset manipulation that addresses views about progress steadiness, leading goal pursuers to see progress unsteadiness (vs. steadiness) as the common and normal path to successful goal attainment. We hypothesized that this manipulation would affect the motivational damage goal pursuers feel from progress unsteadiness, such that those exposed to the Unsteady Expectations (UE) mindset would show less negative effects of unsteady progress than those exposed to the Steady Expectations (SE) mindset.

2. Empirical studies

The present research examines how progress steadiness affects motivation. Studies 1a and 1b investigated how progress steadiness affects motivation through controlled scenarios manipulating progress steadiness in savings and dieting goals. Study 2 examined how recalling a real-life goal that varied in progress steadiness affected motivation. Study 3 examined how manipulations of real-time steady or unsteady progress affected motivation to continue with a behavioral task; it further investigated the mediating role of self-efficacy in driving this effect. Study 4 examined effects of progress steadiness on behavioral choice. Finally, Study 5 examined how the Unsteady Expectations mindset manipulation, which alters expectations about progress steadiness, mitigates the motivational damage of unsteady progress.

All studies were preregistered at AsPredicted (links provided within the text of the relevant studies), and any deviations from the preregistration are noted and explained. We report all data exclusions and measures for every study. All sample sizes were determined a priori. All data were collected in adherence with APA ethics code, and study procedures were approved by the Institutional Review Board of the institution where the data was collected. All data and materials are available online at:

https://osf.io/kqugd/?view_only=6590875c24db48a483d6c427d470d037. Exact wordings for all studies' scale items are listed in Appendix A.

2.1 Study 1a

Study 1a examined the effect of progress steadiness on motivation. We predicted that participants who imagined experiencing unsteady (vs. steady) goal progress in a savings goal scenario would report less sense of accomplishment, less motivation to continue, and more intention to quit.

2.1.1 Method

2.1.1.1 Participants

Power calculation using G*Power was performed before the start of data collection based on an effect size obtained from a pilot study that investigated the effect of this manipulation on our dependent variables ($f = .28$). Power calculations suggested that a sample of a minimum of 166 participants (minimum 83 participants per condition) would provide approximately 95% power to detect an effect of this size or larger. We aimed to recruit 200 participants total (100 participants per condition). Our final sample consisted of 200 participants from CloudResearch (95 men, 104 women, 1 other; mean age = 38.05 years, $SD = 12.06$; 74.0% White, 9.0% Black, 8.5% Asian, 5.0% Latinx, 1.5% Native American, 2.0% Other). No participants were excluded as we had not pre-registered any exclusion rules.

2.1.1.2 Procedure and materials

The study was preregistered at https://aspredicted.org/5XL_X5L. In this between-subjects study, participants were asked to “imagine that you have a savings goal of saving \$2,400 over the next 12 months.” They were assigned to one of two conditions – steady ($N = 101$) or unsteady ($N = 99$). Participants in the steady condition read the following statements, one after another:

After month 1, you have saved \$200.

After month 2, you have saved an additional \$200, so you have saved \$400 total.

After month 3, you have saved an additional \$200, so you have saved \$600 total.

After month 4, you have saved an additional \$200, so you have saved \$800 total.

After month 5, you have saved an additional \$200, so you have saved \$1,000 total.

After month 6, you have saved an additional \$200, so you have saved \$1,200 total.

Participants in the unsteady condition read statements on how much they saved each month, one after another:

After month 1, you have saved \$600.

After month 2, you have saved \$0, so you have saved \$600 total.

After month 3, you have spent \$200 from your savings, so you have saved \$400 total.

After month 4, you have saved an additional \$1,200, so you have saved \$1,600 total.

After month 5, you have saved \$0, so you have saved \$1,600 total.

After month 6, you have spent \$400 from your savings, so you have saved \$1,200 total.

The order in which the amount of dollars saved were presented in the unsteady condition was randomized, to ensure that effects were not driven by any particular order (e.g., ending on a good or bad month). For example, while one participant in the unsteady condition read that in month 1 they saved \$600, in month 2 they saved \$0, in month 3 they spent \$200, in month 4 they saved \$1,200, in month 5 they saved \$0, and in month 6 they spent \$400, a different participant in the unsteady condition read that in month they spent \$400, in month 2 they saved \$0, in month three they spent \$200, in month 4 they saved \$600, in month 5 they saved \$0, and in month 6 they saved \$1,200. Afterwards, participants in both conditions read, “You have 6 more months to go and \$1,200 more to save to meet your savings goal. As a mid-point check-in, how do you feel?” It is important to note that after six months, participants in both the steady and unsteady conditions had saved the identical amount at the same speed – i.e., both had saved \$1,200 total in 6 months. Thus, progress level and speed were held constant. Participants then completed the measures as listed below (all measured on a scale, 1 = Strongly disagree, 7 = Strongly agree).

Manipulation check. Participants responded to two manipulation check items (e.g., “In the vignette, so far, I have made steady (i.e., linear) progress towards my savings goal,” and “In the vignette, so far, I have made unsteady (i.e., non-linear) progress towards my savings goal.”).¹

Sense of accomplishment. Participants’ sense of accomplishment was measured using three items (i.e., “I feel accomplished after seeing my progress,” “I feel a sense of achievement after seeing my progress,” and “I feel like I have made headway after seeing my progress”; $\alpha = .95$; see Appendix A for all items for all scales).

Motivation to continue. Participants indicated their motivation to continue pursuing this weight loss goal using three items (i.e., “I feel motivated to continue saving money,” “I feel driven to continue saving money,” and “I feel encouraged to keep saving money”; $\alpha = .95$).

Intention to quit. Intention to quit was measured using three items (i.e., “I could see myself quitting now,” “I may give up soon on saving money,” and “There is a chance I stop pursuing my savings goal”; $\alpha = .91$).

2.1.2 Results

For all measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 6.71, SD = .67$) than did those in the unsteady condition ($M = 3.39, SD = 2.00$), $F(1, 198) = 249.92, p < .001$ ($\eta^2 = .558$). Participants in the unsteady condition reported having made more unsteady progress ($M = 4.88, SD = 1.86$) than did those in the steady condition ($M = 2.27, SD = 1.23$), $F(1, 198) = 137.68, p < .001$ ($\eta^2 = .410$).

¹ In all our studies, the manipulation checks were administered before the other measures were administered. In future studies, we will administer manipulation checks after participants answer other measures.

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 4.94$, $SD = 1.31$) than did those in the steady condition ($M = 6.42$, $SD = .82$), $F(1, 198) = 92.15$, $p < .001$ ($\eta^2 = .318$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 5.93$, $SD = 1.03$) than did those in the steady condition ($M = 6.62$, $SD = .72$), $F(1, 198) = 30.28$, $p < .001$ ($\eta^2 = .133$).

Intention to quit. As predicted, participants in the unsteady condition reported more intention to quit ($M = 2.33$, $SD = 1.28$) than did those in the steady condition ($M = 1.86$, $SD = 1.17$), $F(1, 198) = 7.32$, $p = .006$ ($\eta^2 = .036$).

2.1.3 Discussion

Study 1a found preliminary support for our main hypothesis. Participants who imagined making unsteady progress reported lower sense of accomplishment, less motivation to continue, and more intention to quit a savings goal, even though their speed and amount of progress were equal to those making steady progress.

We replicated this design using a weight loss goal (see Study S1 in the supplemental studies) and found identical results. These goal domains allow for both zero and reverse progress, as when participants lose no weight or gain weight while pursuing a weight loss goal. To clarify whether such plateaus or reverse progress are needed for this effect to occur, we also tested this effect in a domain where reverse progress was unlikely (a specific work task), so just occurred more slowly or quickly. The results replicated in this context as well (see Study S2 in the supplemental studies).

Although Study 1a controlled for speed and amount of progress, a flaw of its design was that individuals in the two conditions experienced different numbers of successes: Participants in the unsteady condition had months in which they failed to meet their monthly goal (e.g., they did

not save anything or overspent), and months in which they outperformed their goal. In contrast, those in the steady condition met their goal each month. We thus cannot determine from Study 1a if the effects are about the overall pattern of steadiness or the number of times that participants did not meet their goal. In real life, of course, these two processes are almost always entangled – variation in progress is going to usually mean some failures and some successes. However, for our purposes, we thought it useful to determine whether unsteadiness has an effect on motivation that is distinguishable from the number of episodic failure experiences. Therefore, in Study 1b, we equated the number of failures participants experienced in both conditions.

2.2 Study 1b

Study 1b examined whether progress steadiness affects motivation even when participants experience the same number of sub-goal failures in a weight loss vignette.

2.2.1 Method

2.2.1.1 Participants

Power calculations using G*Power were performed before the start of data collection based on an effect size obtained from a pilot study that investigated the effect of this manipulation on our dependent variables ($f = .15$). Power calculations suggested that a sample of 610 participants (305 participants per condition) would provide approximately 95% power to detect an effect of this size or larger. Thus, we aimed to recruit 610 participant responses total. Our final sample consisted of 611 participants from Prolific (300 men, 305 women, 6 other; mean age = 39.56 years, $SD = 13.88$; 81.3% White, 6.5% Black, 7.0% Asian, 3.4% Latinx, 0.3% Native American, 1.3% Other). No participants were excluded, as we had not pre-registered any exclusion rules.

2.2.1.2 Procedure and materials

The study was preregistered at https://aspredicted.org/SN3_2YJ. All participants were told to “imagine that you have a goal of losing 20 pounds over the next 20 weeks.” As in Study 1a, they were assigned one of two conditions – steady ($N = 306$) or unsteady ($N = 305$) condition. To equate failure experiences across conditions, while still creating the experience of steady versus unsteady progress, we embedded the failure events (when they did not lose weight, or gained weight) early in the goal pursuit of those in the steady condition, and randomly dispersed throughout the pursuit of those in the unsteady condition. Participants in the steady condition read the following statements:

After week 1, you have gained 1 pound.

After week 2, you have gained an additional 1 pound, so you have gained 2 pounds total.

After week 3, you have lost 0 pounds, so you have gained 2 pounds total.

After week 4, you have lost 0 pounds, so you have gained 2 pounds total.

After week 5, you have lost 2 pounds, so you have lost 0 pounds total.

After week 6, you have lost an additional 2 pounds, so you have lost 2 pounds total.

After week 7, you have lost an additional 2 pounds, so you have lost 4 pounds total.

After week 8, you have lost an additional 2 pounds, so you have lost 6 pounds total.

After week 9, you have lost an additional 2 pounds, so you have lost 8 pounds total.

After week 10, you have lost an additional 2 pounds, so you have lost 10 pounds total.

Participants in the unsteady condition read statements on how many pounds they lost each week, one after another:

After week 1, you have lost 0 pounds.

After week 2, you have lost 1 pound, so you have lost 1 pound total.

After week 3, you have lost an additional 1 pound, so you have lost 2 pounds total.

After week 4, you have gained 1 pound, so you have lost 1 pound total.

After week 5, you have lost an additional 5 pounds, so you have lost 6 pounds total.

After week 6, you have lost an additional 3 pounds, so you have lost 9 pounds total.

After week 7, you have lost an additional 1 pound, so you have lost 10 pounds total.

After week 8, you have lost 0 pounds, so you have lost 10 pounds total.

After week 9, you have lost an additional 1 pound, so you have lost 11 pounds total.

After week 10, you have gained an additional 1 pound, so you have lost 10 pounds total.

The order in which the number of pounds lost or gained was presented in the unsteady condition was again randomized to ensure that results did not depend on a specific pattern. For example, while one participant in the unsteady condition read that throughout the weeks they lost 0 pounds, then lost 1 pound, then lost 1 pound, then gained 1 pound, then lost 5 pounds, then lost 3 pounds, then lost 1 pound, then lost 0 pounds, then lost 1 pound, then gained 1 pound in that order, another participant in the unsteady condition read that they lost 1 pound, gained 1 pound, lost 3 pounds, lost 0 pounds, gained 1 pound, lost 0 pounds, lost 1 pound, lost 5 pounds, lost 1 pound, then lost 1 pound in that order. Afterwards, participants in both conditions read, “You have come 10 weeks and have lost 10 pounds. You have 10 more weeks to go and 10 more pounds to lose to meet your goal weight. As a mid-point check-in, how do you feel?” Once again, the number of pounds that the participants lost in 10 weeks remained the same in both conditions, to ensure that level and speed of progress were identical. Afterwards, participants completed the measures as listed below (all measured on the scale, 1 = Strongly disagree, 7 = Strongly agree).

Manipulation check, sense of accomplishment, motivation to continue, and intention to quit. Participants responded to the same manipulation check items, sense of accomplishment items ($\alpha = .93$), motivation to continue items ($\alpha = .93$), and intention to quit items ($\alpha = .93$) as in Study 1a but worded to reflect a weight loss scenario (see Appendix A for full list of items).

2.2.2 Results

Again, for all measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 6.46$, $SD = .73$) than did those in the unsteady condition ($M = 4.65$, $SD = 1.69$), $F(1, 609) = 298.59$, $p < .001$ ($\eta^2 = .329$). Participants in the unsteady condition reported having made more unsteady progress ($M = 4.40$, $SD = 1.77$) than did those in the steady condition ($M = 2.20$, $SD = 1.44$), $F(1, 608) = 137.68$, $p < .001$ ($\eta^2 = .318$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 5.78$, $SD = .87$) than did those in the steady condition ($M = 6.19$, $SD = .72$), $F(1, 609) = 39.17$, $p < .001$ ($\eta^2 = .060$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 6.09$, $SD = .83$) than did those in the steady condition ($M = 6.41$, $SD = .66$), $F(1, 609) = 27.15$, $p < .001$ ($\eta^2 = .043$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 2.38$, $SD = 1.21$) than did those in the steady condition ($M = 2.13$, $SD = 1.11$), $F(1, 609) = 7.14$, $p = .008$ ($\eta^2 = .012$).

2.2.3 Discussion

Study 1b found that unsteady progress reduced motivation independently of the tendency to experience more sub-goal failures. When failures were part of a linear trend towards steady progress, participants' motivation was protected. In contrast, when the failures were scattered throughout goal pursuit, as in unsteady progress, participants' experience was much more negative.

2.3 Study 2

Study 2 used a recall paradigm to explore the effect of progress steadiness on motivation with participants' own everyday goals.

2.3.1 Method

2.3.1.1 Participants

Power calculations using G*Power were performed before the start of data collection based on an effect size obtained from a pilot study testing the effect of this manipulation on our dependent variables ($f = .23$). Power calculations suggested that a sample of 255 participants would provide approximately 95% power to detect an effect of this size or larger. Thus, we aimed to recruit 300 participant responses total. Our final sample consisted of 302 participants from Prolific (156 men, 145 women, 1 other; mean age = 40.59 years, $SD = 12.51$; 77.2% White, 10.9% Black, 5.3% Asian, 3.6% Latinx, 0.3% Native American, 0.7% Pacific Islander, 2.0% Other). No participants were excluded, as we had not pre-registered any exclusion rules.

2.3.1.2 Procedure and materials

The study was preregistered at https://aspredicted.org/QNF_T65. Participants were randomly assigned to either the steady ($N = 149$) or unsteady ($N = 153$) condition. Participants in the steady condition read:

Please **recall the most recent time you made steady progress while working towards a goal you are *currently pursuing*. Making steady progress means that you make the *same amount of progress consistently each time you pursue the goal***. In the box below, **please state the goal you are *currently pursuing* and *describe in detail the steady progress you made while working towards achieving your goal***.

In contrast, those in the unsteady condition read:

Please **recall the most recent time you made unsteady progress while working towards a goal you are currently pursuing.** Making unsteady progress means that **you make varying amounts of progress inconsistently each time you pursue the goal.** In the box below, **please state the goal you are currently pursuing and describe in detail the unsteady progress you made while working towards achieving your goal.**

After reading the prompt, participants engaged in this recall writing exercise for three minutes. For example, participants in the steady condition wrote: “When I was building my dollhouse had I steady progress because I worked in sections of the house. I was able to steadily build each level at a time... I started with the bottom floor and slowly worked my way up to the bedrooms and kitchen. The last portion was the roof and shingles. As I was making my way up through a steady process I noticed it was getting easier to complete,” and “I am trying to build up my push-up reps to fifty. When I first started a few weeks ago, I could only do twenty at a time. Gradually, I was able to do more. A week later, I could do twenty-five. Then I could do thirty and thirty-five. I can currently do forty push-ups at a time so I am making consistent progress towards my goal of fifty.” As examples, participants in the unsteady condition wrote: “I am currently saving up to buy a new gaming PC. I don't make the same amount of money each month but my regular bills are the same each month so the amount I am able to save each month varies,” and “One time that I made unsteady progress was in my current job. I work as a salesman for my employment, and I started off very well training for the job. When it was time to get on the phones, I began to have trouble keeping people and getting leads. I dealt with nervousness and doubt, but as I continued to work I finally made a breakthrough, and things became much easier for me. I still learn things every day on this job but at times I will have a rapid realization which springboards me up a level in my comprehension and performance.”

Manipulation check, sense of accomplishment, motivation to continue, and intention to quit. Participants then responded to the same manipulation check items, sense of accomplishment items ($\alpha = .94$), motivation to continue items ($\alpha = .92$), and intention to quit items ($\alpha = .97$) as in Study 1a but worded to reflect real-life goal pursuit (see Appendix A for full list of items).

Exploratory analyses: Coding of goal domains. Although not pre-registered, post-hoc, we tested whether the goals reported in the two conditions differed in type, to determine if the effects in Study 2 were driven by a potential confound. For example, if participants in the unsteady condition all thought about weight loss while those in the steady condition all thought about work goals, that would create a problematic confound. We thus asked two coders to categorize each written response into one of the following 15 goal domains: (1) Academic/professional, (2) charity/activism, (3) community, (4) domestic responsibilities, (5) emotion-management, (6) family, (7) financial, (8) health/fitness, (9) hobby, (10) leisure, (11) pleasure/enjoyment, (12) self-improvement, (13) social/friends, (14) spiritual/religious, (15) survival needs, and other (Wingrove et al., 2023). The two coders had an ICC of .86. The two coders agreed on the goal domain for 265 out of 302 written responses. When the coders disagreed on which goal domain (i.e., for 37 out of 302), a third coder made a final decision. Overall, results using a chi-square test showed that there was no significant difference in types of goals reported by those in the steady versus unsteady conditions, $\chi^2(12) = 13.56, p = .329$ (Table 1). This gives us some confidence that despite the lowered control in this recall paradigm, the everyday goals participants reported were similar across conditions.

Table 1: Number of participants who wrote about each goal domain (Study 2).

Domain	Steady	Unsteady	Total	Percentage of Total
(1) Academic/professional	27	36	63	20.9%
(2) Charity/activism	0	0	0	0%
(3) Community	0	1	1	0.3%
(4) Domestic responsibilities	12	16	28	9.3%
(5) Emotion-management	0	1	1	0.3%
(6) Family	4	3	7	2.3%
(7) Financial	21	15	36	11.9%
(8) Health/fitness	52	55	107	35.4%
(9) Hobby	16	12	28	9.3%
(10) Leisure	0	3	3	1.0%
(11) Pleasure/enjoyment	1	0	1	0.3%
(12) Self-improvement	0	1	1	0.3%
(13) Social/friends	0	0	0	0%
(14) Spiritual/religious	0	0	0	0%
(15) Survival needs	0	1	1	0.3%
Other	0	0	0	0%
Gibberish answer	16	9	25	8.3%
Total	149	153	302	100%

2.3.2 Results

For all the following measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 5.93$, $SD = 1.00$) than did those in the unsteady condition ($M = 2.88$, $SD = 1.67$), $F(1, 300) = 370.23$, $p < .001$ ($\eta^2 = .552$). Participants in the unsteady condition reported having made more unsteady progress ($M = 5.59$, $SD = 1.16$) than did those in the steady condition ($M = 2.60$, $SD = 1.69$), $F(1, 300) = 322.12$, $p < .001$ ($\eta^2 = .518$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 4.24$, $SD = 1.40$) than did those in the steady condition ($M = 5.65$, $SD = 1.14$), $F(1, 300) = 91.79$, $p < .001$ ($\eta^2 = .234$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 5.48$, $SD = 1.16$) than did those in the steady condition ($M = 6.15$, $SD = .99$), $F(1, 300) = 28.72$, $p < .001$ ($\eta^2 = .087$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 3.10$, $SD = 1.74$) than did those in the steady condition ($M = 2.62$, $SD = 1.82$), $F(1, 300) = 5.51$, $p = .020$ ($\eta^2 = .018$).

2.3.2 Discussion

Study 2 found that recalling unsteady progress reduced motivation for real-life and ongoing goals. When participants recalled a recent experience of unsteady (vs. steady) progress, they felt less motivated to keep pursuing their goal.

2.4 Study 3

Study 3 manipulated progress steadiness in real time during an achievement task. The study used incentives to create goals for an achievement task, which meant that participants shared the same goal. This allowed us to manipulate participants' experience of progress steadiness in a controlled manner. Study 3 also explored a potential explanation for why progress steadiness affects motivation, measuring and testing the mediating role of self-efficacy. We theorized that if making unsteady progress reduces self-efficacy, this may drive its negative effects on motivation: Unsteady goal pursuers may conclude that variation in their outcomes means that they can predict goal attainment with less certainty, which then makes them feel less motivated to persist.

2.4.1 Method

2.4.1.1 Participants

Power calculations were performed before the start of data collection based on an effect size obtained from a pilot study investigating the effect of this manipulation on our dependent variables ($f = .20$). Power calculations suggested that a sample of 322 participants would provide approximately 95% power to detect an effect of this size or larger. Thus, we aimed to recruit 322 participant responses total. Prolific recruited a total sample of 318 participants (159 men, 159 women; mean age = 39.29 years, $SD = 13.07$; 82.7% White, 6.0% Black, 4.4% Asian, 4.7% Latinx, 0.3% Native American, 1.9% Other). No participants were excluded, as we had not specified any rules for excluding observations in our pre-registration.²

2.4.1.2 Procedure and materials

The study was preregistered at https://aspredicted.org/V1G_5TH. All participants were instructed to solve 40 questions from the Raven's Progressive Matrices test (Raven, 1965), a nonverbal ability test used to measure abstract reasoning. Overall, participants were told that their goal was to get 20 or more questions correct in order to earn a \$2 bonus. Rather than seeing all 40 questions on a single page, participants solved 4 questions at a time, per page. They had 30 seconds to solve 4 questions each time. After they solved the set of 4 questions, they received feedback on how many questions they got correct. This feedback was manipulated, such that participants were led to believe they were making steady or unsteady progress towards their goal

² At the end of the survey, participants had the chance to "write any comments you would like to leave for the researchers" in an open-ended box. A research assistant blind to hypotheses read only the comments and flagged participants who wrote that they were suspicious of our manipulation. Significance and directionality of results remained unchanged or were stronger when we excluded 16 participants (4.97%) who reported suspicion. Because we did not pre-register excluding any data, we included all participants' data in our reported analyses.

of solving 20 questions correctly. Participants solved the first 5 sets of 4 questions, then answered questions about their motivation for continuing with the next 5 sets.

Participants in the steady condition ($N = 156$) received the following false feedback:

You have gotten 2 out of 4 questions correct in this set.

You have gotten an additional 2 out of 4 questions correct in this set. So, you have gotten 4 out of 8 correct total so far.

You have gotten an additional 2 out of 4 questions correct in this set. So, you have gotten 6 out of 12 correct total so far.

You have gotten an additional 2 out of 4 questions correct in this set. So, you have gotten 8 out of 16 correct total so far.

You have gotten an additional 2 out of 4 questions correct in this set. So, you have gotten 10 out of 20 correct total so far.

Participants in the unsteady condition ($N = 162$) received the following false feedback, with the number of questions correct presented in randomized order (as in Studies 1a and 1b):

You have gotten 4 out of 4 questions correct in this set.

You have gotten 0 out of 4 questions correct in this set. So, you have gotten 4 out of 8 correct total so far.

You have gotten an additional 4 out of 4 questions correct in this set. So, you have gotten 8 out of 12 correct total so far.

You have gotten an additional 2 out of 4 questions correct in this set. So, you have gotten 10 out of 16 correct total so far.

You have gotten 0 out of 4 questions correct in this set. So, you have gotten 10 out of 20 correct total so far.

To increase believability of the false feedback, we chose difficult questions that created an ambiguous situation for participants. Pilot testing found that participants on average answered fewer than half of the questions correctly. Likewise, participants in the study scored 9 out of 20 on average (i.e., 45% accuracy), which was close to the total number of questions we falsely told them that they got correct (i.e., 10 out of 20).³ We also made the time constraint quite extreme, with participants having only 30 seconds for four questions, which meant that they only had 7.5 seconds for each question. Thus, participants were largely forced to rush, which we intended to reduce confidence and increase believability of the feedback.⁴

After completing five sets, participants in both conditions were told that they had answered 10 out of 20 questions correctly up to this point. Then, they read, “You have 20 more questions to go and 10 more questions to get correct in order to earn the \$2 bonus. As a mid-point check-in, how do you feel?” Participants then completed the measures as listed below (all measured on a scale, 1 = Strongly disagree, 7 = Strongly agree). Finally, we told participants that because they had already gotten half of the questions right and therefore were on track, they did not have to solve the remaining 20 problems. Instead, all received the \$2 bonus.

Manipulation check, sense of accomplishment, motivation to continue, and intention to quit. Participants responded to two manipulation check items (e.g., “So far, I have made (1) steady / (2) unsteady progress towards the goal of earning the bonus”). They reported their sense of accomplishment ($\alpha = .96$), motivation to continue ($\alpha = .95$), and intention to quit ($\alpha = .97$),

³ We did not predict any effect of the manipulation on task performance, given the extremely short time and high level of difficulty of the task. Indeed, we did not find any performance effects in any of the studies using this paradigm (see Appendix C for details).

⁴ Attrition rate was low and comparable between conditions (i.e., dropout rates: steady condition = 3.8%; unsteady condition = 2.1%).

using the same items as in prior studies modified to reflect this task (e.g., “Based on my progress so far, I feel motivated to continue solving the remaining problems to strive for the \$2 bonus”).

Self-efficacy. Using an adapted version of an 8-item self-efficacy scale (Chen et al., 2001), participants reported their sense of self-efficacy on this task (e.g., “I am confident that I can perform effectively on this task.”; $\alpha = .97$).

2.4.2 Results

Again, for all measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 5.60$, $SD = 1.21$) than did those in the unsteady condition ($M = 3.10$, $SD = 1.61$), $F(1, 316) = 243.80$, $p < .001$ ($\eta^2 = .436$). Additionally, participants in the unsteady condition reported having made more unsteady progress ($M = 5.06$, $SD = 1.48$) than did those in the steady condition ($M = 2.63$, $SD = 1.50$), $F(1, 316) = 211.70$, $p < .001$ ($\eta^2 = .401$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 3.81$, $SD = 1.53$) than did those in the steady condition ($M = 4.35$, $SD = 1.52$), $F(1, 316) = 9.94$, $p = .002$ ($\eta^2 = .030$).

Motivation to continue. Participants in the unsteady condition reported marginally less motivation to continue ($M = 4.71$, $SD = 1.59$) than did those in the steady condition ($M = 5.01$, $SD = 1.37$), $F(1, 316) = 3.39$, $p = .066$ ($\eta^2 = .011$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 4.32$, $SD = 1.92$) than did those in the steady condition ($M = 3.82$, $SD = 1.92$), $F(1, 316) = 5.36$, $p = .021$ ($\eta^2 = .017$).

Self-efficacy. As predicted, participants in the unsteady condition reported less efficacy regarding this task ($M = 4.07$, $SD = 1.43$) than did those in the steady condition ($M = 4.44$, $SD = 1.21$), $F(1, 316) = 6.09$, $p = .014$ ($\eta^2 = .019$).

Self-efficacy as a mediator. We tested whether self-efficacy mediated the effect of progress steadiness on motivation. We used Hayes' 2013 PROCESS macro (model 4) with 5,000 bootstrap samples to test each of the mediators separately. As predicted, we found a significant negative indirect effect of experiencing unsteady (vs. steady) progress via self-efficacy on sense of accomplishment ($b = -.30$, 95% CI $[-.55, -.07]$; Figure 1) and motivation to continue ($b = -.28$, 95% CI $[-.51, -.06]$; Figure 2), and a significant positive effect on intention to quit ($b = .22$, 95% CI $[.04, .41]$; Figure 3).

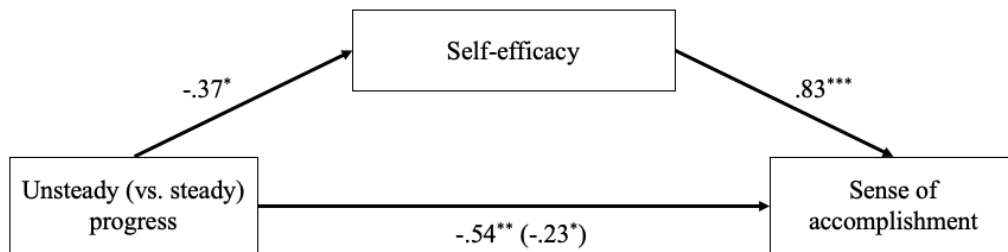


Figure 1: Self-efficacy mediates the effect of progress steadiness on sense of accomplishment (Study 3).

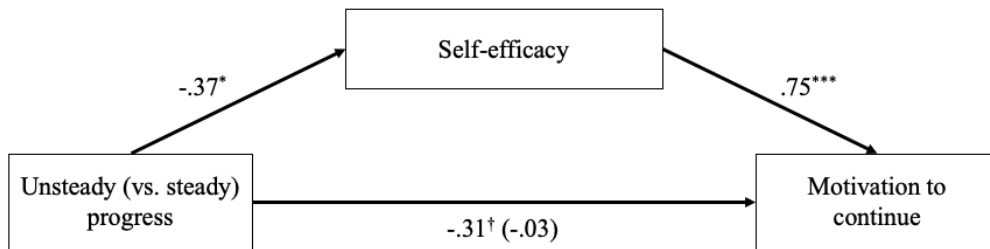


Figure 2: Self-efficacy mediates the effect of progress steadiness on motivation to continue (Study 3).

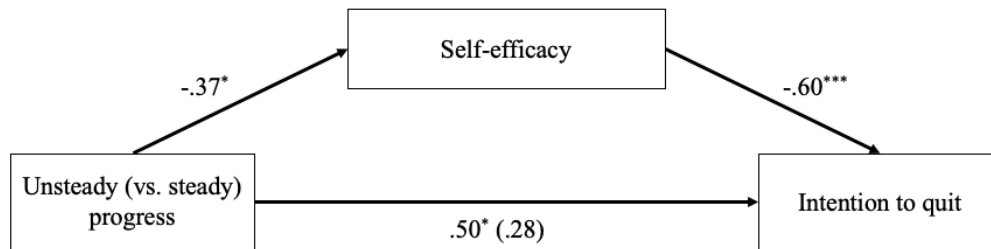


Figure 3: Self-efficacy mediates the effect of progress steadiness on intention to quit (Study 3).

2.4.3 Discussion

In a controlled experiment using a real-time performance task, Study 3 found the predicted effect of progress steadiness on motivation. False feedback about the steadiness of participants' progress towards earning a bonus \$2 affected their sense of accomplishment, motivation on the task, and their intention to quit. Study 3 also provided evidence for the role of self-efficacy in explaining this effect. All three effects were mediated by participants' reduced beliefs in their ability to succeed on the task. Although mediational analyses have significant limitations (Bullock et al., 2010; Fiedler et al., 2018; Giner-Sorolla, 2016), these results suggest that self-efficacy may play a role in this effect.

2.5 Study 4

Study 4 explores the effect of progress steadiness on goal-directed behavior. Given the negative effects of unsteady progress on motivation in the prior studies, we predicted that unsteady progress would also make participants likelier to quit their pursuit, as measured by the choice to switch to a different task. Switching to a new task is a common behavioral measure of motivation (e.g., Heine & Raineri, 2009; Woolley & Risen, 2018; Woolley & Sharif, 2022). We set up a paradigm in which participants had the chance to persist with the same activity or to switch to a new task. To incentivize participants to persist with the same task, we offered a higher payout for successful completion on the same task, and a lower payout for successful completion

of a different task. In this way, we made it less economically rational for participants to switch to a new task. We predicted that participants who experienced unsteady progress would opt to switch tasks more often than would those who experienced steady progress.

2.5.1 Method

2.5.1.1 Participants

Power calculations using G*Power were performed before the start of data collection based on effect sizes obtained from piloting. Pilot testing showed that the effect sizes for the three self-report DVs varied; power calculations suggested that a sample of 820 participants would provide approximately 80% power to detect an effect of the same size or larger for the weakest effect of the three, and 99% power for the other two DVs. Thus, we aimed to recruit 820 participant responses total. Power calculations for the new behavioral choice DV ($\phi = .211$; the calculated effect size, phi, for a chi-square test) showed that this sample size would provide approximately 99% power. The final sample of participants recruited from Prolific consisted of 820 participants (407 men, 399 women, 14 other; mean age = 36.05 years, SD = 13.39; 75.5% White, 5.2% Black, 9.9% Asian, 5.9% Latinx, 0.5% Native American, 0.2% Pacific Islander, 2.8% Other). No participants were excluded as per our pre-registration.⁵

2.5.1.2 Procedure and materials

This between-subjects study was preregistered at https://aspredicted.org/BP1_RD9. Participants were instructed to solve 60 visual pattern questions and to get 40 or more questions correct to earn a \$2 bonus. Participants solved 3 questions at a time and were given 30 seconds to solve them. After each round of 3 questions, they received false feedback on how many questions

⁵ Participants' suspicion was measured using the same method as in Study 3. Significance and directionality of results remained unchanged when we excluded 71 participants (8.66%) who reported suspicion about the feedback.

they got correct. At the half-way point, participants answered questions about their mid-way motivation. Participants in the steady condition ($N = 408$) received the following false feedback:

You have gotten 2 out of 3 questions correct in this set.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 4 out of 6 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 6 out of 9 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 8 out of 12 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 10 out of 15 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 12 out of 18 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 14 out of 21 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 16 out of 24 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 18 out of 27 correct total so far.

You have gotten an additional 2 out of 3 questions correct in this set. So, you have gotten 20 out of 30 correct total so far.

Participants in the unsteady condition ($N = 412$) received the following false feedback (in randomized order; as in Studies 1a and 1b):

You have gotten 3 out of 3 questions correct in this set.

You have gotten an additional 3 out of 3 questions correct in this set. So, you have gotten 6 out of 6 correct total so far.

You have gotten 1 out of 3 questions correct in this set. So, you have gotten 7 out of 9 correct total so far.

You have gotten an additional 3 out of 3 questions correct in this set. So, you have gotten 10 out of 12 correct total so far.

You have gotten 0 out of 3 questions correct in this set. So, you have gotten 10 out of 15 correct total so far.

You have gotten an additional 3 out of 3 questions correct in this set. So, you have gotten 13 out of 18 correct total so far.

You have gotten an additional 3 out of 3 questions correct in this set. So, you have gotten 16 out of 21 correct total so far.

You have gotten 0 out of 3 questions correct in this set. So, you have gotten 16 out of 24 correct total so far.

You have gotten an additional 3 out of 3 questions correct in this set. So, you have gotten 19 out of 27 correct total so far.

You have gotten 1 out of 3 questions correct in this set. So, you have gotten 20 out of 30 correct total so far.⁶

After ten sets, participants in both conditions were told that they had answered 20 out of 30 questions correctly. Participants in both conditions then read, “So far, you have gotten 20 out of 30 questions correct. You have 30 more questions to go and 20 more questions to get correct in

⁶ Attrition rate was low and comparable between conditions (i.e., dropout rates: steady condition = 4.8%; unsteady condition = 5.6%).

order to score 40/60 and earn the \$2 bonus. As a mid-point check-in, how do you feel?”

Participants then completed the manipulation check, sense of accomplishment, motivation to continue, and intention to quit measures, listed below (all measured on the scale, 1 = Strongly disagree, 7 = Strongly agree).

Manipulation check, sense of accomplishment, motivation to continue, and intention to quit. At this mid-point, using the same items as in Study 3, participants responded to the manipulation check items and reported their sense of accomplishment ($\alpha = .96$), motivation to continue ($\alpha = .95$), and intention to quit ($\alpha = .98$).

Task choice. Afterwards, we told participants that they would move on to solve the remaining half of the problems. We reminded participants of how many questions they got correct per set, and their total (equal across conditions). Then, participants chose between two options for the rest of the study. Option 1: “Stick to solving more visual patterns that are similar to the problems you have solved so far – you will receive a final bonus payment of \$3 if your final score is equal to or greater than 40/60” versus Option 2: “Switch to solving a different task that is not related to visual patterns – you will receive a final bonus payment of \$2 if your final score is equal to or greater than 40/60.”

After participants chose which task to complete, we told participants that they did not have to solve the remaining 30 problems. All received the \$3 bonus.

2.5.2 Results

Again, for all measures, we performed a one-way analysis of variance (ANOVA), unless noted otherwise.

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made steadier progress towards the goal of earning the bonus ($M = 5.68$, $SD = 1.37$) than did those in the unsteady condition ($M = 4.01$, $SD = 1.60$), $F(1, 818) =$

258.53, $p < .001$ ($\eta^2 = .240$). Participants in the unsteady condition reported having made more unsteady progress towards the goal of earning the bonus ($M = 4.36$, $SD = 1.66$) than did those in the steady condition ($M = 2.47$, $SD = 1.55$), $F(1, 818) = 285.27$, $p < .001$ ($\eta^2 = .259$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 3.84$, $SD = 1.49$) than did those in the steady condition ($M = 4.24$, $SD = 1.57$), $F(1, 818) = 14.40$, $p < .001$ ($\eta^2 = .017$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 4.47$, $SD = 1.68$) than did those in the steady condition ($M = 5.01$, $SD = 1.56$), $F(1, 818) = 22.74$, $p < .001$ ($\eta^2 = .027$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 4.91$, $SD = 1.85$) than did those in the steady condition ($M = 4.33$, $SD = 2.00$), $F(1, 818) = 18.73$, $p = .014$ ($\eta^2 = .022$).

Task choice. In the steady condition, 228 participants (55.9%) chose to persist on the task, whereas 180 participants (44.1%) chose to switch to a new task. In contrast, in the unsteady condition, 136 participants (33.0%) chose to persist, and 276 participants (67.0%) chose to switch. A chi-square test of independence showed that this choice was affected by condition, $\chi^2(1) = 43.45$, $p < .001$, $\phi_c = .23$.

2.5.3 Discussion

Study 4 supported our hypotheses in a real-time progress experiment, extending our results to include a real-life choice of tasks. Replicating earlier studies, participants who experienced unsteady progress reported lower sense of accomplishment, less motivation to continue, and more intention to quit. Progress steadiness also affected choice, with those who experienced unsteady progress being much likelier to switch tasks, despite the potential for an objectively higher reward (\$3 rather than \$2) by persisting with the current task. We theorize that

the frustrating uncertainty inherent to unsteady progress led participants to seek other tasks, hoping for more predictable returns on their effort. In real life, we suggest a similar tendency would emerge, with people making unsteady progress tending to bail on their goals.

2.6 Study 5

Study 5 aimed to test a theory-based intervention that could buffer individuals against the negative effects of unsteady progress. The intervention targeted people's mindset about progress steadiness to make them either more (or less) comfortable with unsteady progress (i.e., Unsteady Expectations (UE) Mindset vs. Steady Expectations (SE) Mindset). The mindset intervention manipulation thus tests our hypothesis that people's expectations about progress steadiness partly drive the negative effects of unsteadiness. In short, we have theorized that people expect progress to be steady, and when it is not steady, that leads them to feel less self-efficacious, and thus, unmotivated. We hypothesized that if we can target those expectations directly, helping participants feel more positively about unsteady progress, we could in theory protect motivation from the ebbs and flows of typical goal progress.

Study 5 thus aimed to test if the mindset manipulation could help reduce the negative effects of unsteady progress on motivation. In a controlled experiment, participants read the UE or SE mindset manipulation and then read a steady or unsteady vignette. We hypothesized that when met with unsteady progress, the UE Mindset would mitigate negative effects on motivation.

2.6.1 Method

2.6.1.1 Participants

Power calculation using G*Power was performed before the start of data collection based on an effect size obtained from a pilot study that investigated the effect of this mindset manipulation on our dependent variables ($f = .20$). Power calculations suggested that a sample of

a minimum of 595 participants (minimum 149 participants per each of four conditions) would provide approximately 95% power to detect an effect of this size or larger. We aimed to recruit 150 participants per condition (600 participants total). CloudResearch recruited a total of 600 participants. We excluded thirty participants who failed the mindset manipulation check (elaborated on further in the section below), as planned in our pre-registration.⁷ The final sample consisted of 570 participants (215 men, 351 women; mean age = 38.64 years, SD = 12.93; 75.8% White, 8.2% Black, 8.1% Asian, 5.1% Latinx, 0.2% Native American, 0.2% Pacific Islander, 2.5% Other).

2.6.1.2 Procedure and materials

The study was preregistered at https://aspredicted.org/XKH_BGV. This was a 2 (Steady Expectation (SE) Mindset intervention vs. Unsteady Expectation (UE) Mindset intervention) X 2 (steady vs. unsteady weight loss progress) between-subjects design.

First, participants were randomly assigned to read either the SE Mindset article ($N = 297$) or the UE Mindset article ($N = 273$). The article reported on research finding that successful people tend to experience steady (i.e., SE Mindset) or unsteady goal progress (i.e., UE Mindset) during their pursuit, suggesting that goal progress “should” be steady or unsteady. The article was falsely presented as having been sourced from the popular magazine, *Scientific American*. Using false *Scientific American* articles has been successful in manipulating other kinds of goal mindsets in previous research (Mrazek et al., 2018). Our two articles were matched for length and content. The two articles read as follows (bolded statements are the sentences that differed

⁷ Significance of the following results remained unchanged when we included the responses of participants who failed the manipulation check.

between SE Mindset and UE Mindset conditions; refer to Appendix B for exact Scientific American images):

With the new calendar year starting, a new fiscal quarter beginning, and a new academic semester coming up, people are beginning to set new goals. Studies have shown that many students set goals at the beginning of a new semester and many working professionals set goals for the start of a new fiscal quarter.

In order to successfully achieve goals, we all need to make good progress. What scientific studies have shown might surprise you: For the most part, goal progress should be [**steady, or “steady” / unsteady, or “unsteady”**]. Goal progress [**should not / should**] have too many ups and downs. People normally [**make steady progress / do not make steady progress**].

Indeed, longitudinal research studies following participants over time confirm that people who successfully achieved their goals experienced [**steady progress / unsteady progress**] along the way and persevered. For example, high-earning employees aiming to earn bonuses [**received about the same amounts of commissions each month / received different amounts of commissions each month**]. People who successfully hit their goal weight [**lost about the same number of pounds each week / lost a fluctuating number of pounds each week**]. Finally, students who finished their classes with stellar grades [**received consistently similar grades on their small assignments leading up to the final exam / tended to receive inconsistent grades on their small assignments leading up to the final exam**].

What is important is to realize that good goal progress is [**steady and orderly / unsteady and messy**] and continuing to strive towards achieving one’s goals while experiencing [**steady progress / unsteady progress**] ultimately leads people to achieve their goals.

To ensure that participants understood the article and to strengthen the manipulation (Mrazek et al., 2018), participants were asked to “summarize the findings from the article” and

“describe the ways in which your life experiences align with the premise of the article.”

Participants were also asked to rate the accuracy of the statement: “People who successfully achieve goals experience steady progress” [True / False / The article did not mention this].

Responses of participants who answered this final question incorrectly were removed, as per our pre-registration.

Afterwards, participants were asked to “imagine that you have a weight loss goal of 6 pounds over the next 12 weeks.” Then, they were assigned one of two conditions – steady ($N = 285$) or unsteady ($N = 285$) condition. Participants in the steady condition read the following statements, one appearing sequentially after the other after participants pressed enter:

After week 1, you have lost 0.5 pounds.

After week 2, you have lost an additional 0.5 pounds, so you have lost 1 pound total.

After week 3, you have lost an additional 0.5 pounds, so you have lost 1.5 pounds total.

After week 4, you have lost an additional 0.5 pounds, so you have lost 2 pounds total.

After week 5, you have lost an additional 0.5 pounds, so you have lost 2.5 pounds total.

After week 6, you have lost an additional 0.5 pounds, so you have lost 3 pounds total.

Participants in the unsteady condition read the following statements, one appearing sequentially after the other after participants pressed enter:

After week 1, you have lost 1.5 pounds.

After week 2, you have lost 0 pounds, so you have lost 1.5 pounds total.

After week 3, you have gained 0.5 pounds, so you have lost 1 pound total.

After week 4, you have lost an additional 3 pounds, so you have lost 4 pounds total.

After week 5, you have lost 0 pounds, so you have lost 4 pounds total.

After week 6, you have gained 1 pound, so you have lost 3 pounds total.

The order in which the progress units were presented in the unsteady condition was randomized, to ensure that any effect did not depend on a specific order or trajectory of progress (as in Studies 1a and 1b). Afterwards, participants in both conditions read, “You have 6 more weeks to go and 3 more pounds to lose to meet your goal weight. As a mid-point check-in, how do you feel?” Thus, after the six weeks progress report, participants in both conditions had lost equal amounts of 3 pounds in 6 weeks; they were thus matched in overall level of progress and speed of progress.

Participants then answered the same two manipulation check items as in Study 1a. Finally, they completed the same dependent measures as in Study 1a: sense of accomplishment ($\alpha = .96$), motivation to continue ($\alpha = .96$), and intention to quit ($\alpha = .96$).

2.6.2 Results

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 6.69$, $SD = .58$) than did those in the unsteady condition ($M = 2.51$, $SD = .65$), $F(1, 566) = 1706.88$, $p < .001$ ($\eta^2 = .751$). Participants in the unsteady condition reported having made more unsteady progress ($M = 5.65$, $SD = 1.43$) than did those in the steady condition ($M = 1.88$, $SD = .58$), $F(1, 568) = 1700.57$, $p < .001$ ($\eta^2 = .750$).

Main effects of progress type on sense of accomplishment, motivation to continue, and intention to quit. As predicted, participants in the unsteady weight loss condition reported lower sense of accomplishment ($M = 4.88$, $SD = 1.44$) than did those in the steady condition ($M = 6.19$, $SD = 1.00$), $F(1, 568) = 157.84$, $p < .001$ ($\eta^2 = .217$). Also as predicted, participants in the unsteady condition reported less motivation to continue ($M = 5.40$, $SD = 1.38$) than did those in the steady condition ($M = 6.38$, $SD = .86$), $F(1, 568) = 103.24$, $p < .001$ ($\eta^2 = .154$). Finally, as predicted, participants in the unsteady condition reported greater intention to quit ($M = 3.13$, $SD =$

1.61) than did those in the steady condition ($M = 2.00$, $SD = 1.15$), $F(1, 568) = 93.06$, $p < .001$ ($\eta^2 = .141$).

Main effects of mindset on sense of accomplishment, motivation to continue, and intention to quit. We did not have pre-registered, a priori, hypotheses for the main effects of mindset condition on our outcome variables. Therefore, the following results should be interpreted with caution. Results demonstrated that participants in the UE Mindset condition reported greater sense of accomplishment ($M = 5.69$, $SD = 1.12$) than did those in the SE Mindset condition ($M = 5.39$, $SD = 1.60$), $F(1, 568) = 6.62$, $p = .010$ ($\eta^2 = .012$). Participants in the UE Mindset condition also reported greater motivation to continue ($M = 6.01$, $SD = 1.02$) than did those in the SE Mindset condition ($M = 5.78$, $SD = 1.42$), $F(1, 568) = 4.90$, $p = .027$ ($\eta^2 = .009$). Intention to quit did not differ between the UE Mindset ($M = 2.48$, $SD = 1.38$) and the SE Mindset conditions ($M = 2.65$, $SD = 1.62$), $F(1, 568) = 1.76$, $p = .185$ ($\eta^2 = .003$).

Interaction of mindset and progress steadiness on sense of accomplishment. As predicted, and as illustrated in Figure 4, a two-way interaction emerged, $F(1,566) = 70.36$, $p < .001$ ($\eta_p^2 = .111$). Within the SE Mindset condition, progress steadiness had a large effect, $F(1, 566) = 239.19$, $p < .001$: Those who read about unsteady weight loss reported lower sense of accomplishment ($M = 4.35$, $SD = 1.57$) than did those who read about steady weight loss ($M = 6.44$, $SD = .69$). As predicted, this effect was weaker (although still significant) within the UE Mindset condition, $F(1, 566) = 10.29$, $p = .001$: Those who imagined unsteady weight loss reported less accomplishment ($M = 5.47$, $SD = 1.00$) than did those who imagined steady weight loss ($M = 5.92$, $SD = 1.20$), but to a lesser extent than those in the SE Mindset condition.

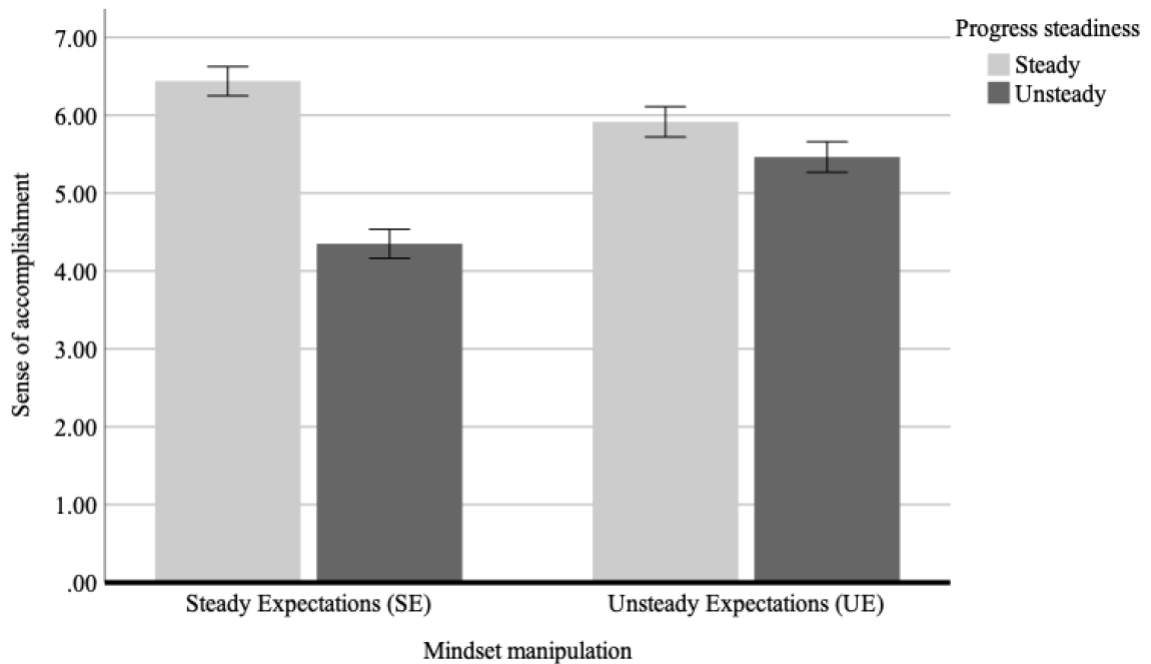


Figure 4: The effect of weight loss progress (steady vs. unsteady) and mindset intervention (SE vs. UE) on sense of accomplishment (Study 5).

Interaction of mindset and progress steadiness on motivation to continue. As predicted, and as illustrated in Figure 5, a two-way interaction emerged, $F(1,566) = 54.23, p < .001$ ($\eta_p^2 = .087$). Simple effects analyses revealed that the effect of experiencing steady or unsteady weight loss was significant within the SE Mindset condition, $F(1, 566) = 163.65, p < .001$: Those who imagined unsteady weight loss reported less motivation to continue ($M = 4.97, SD = 1.53$) than did those who imagined steady weight loss ($M = 6.60, SD = .62$). As predicted, within the UE Mindset condition, the effect of progress steadiness was weaker (although still significant), $F(1, 566) = 4.25, p = .040$: Those who read the unsteady weight loss vignette reported less motivation to continue ($M = 5.88, SD = 1.01$) than did those who read the steady weight loss vignette ($M = 6.15, SD = 1.02$), but to a lesser degree.

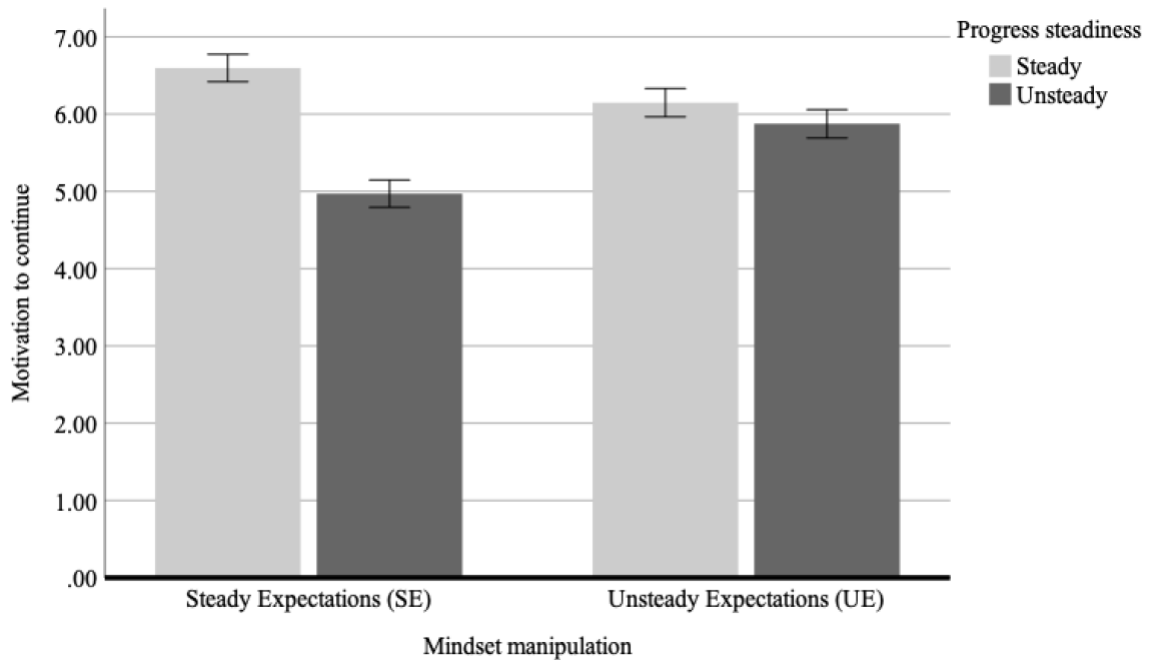


Figure 5: The effect of weight loss progress (steady vs. unsteady) and mindset intervention (SE vs. UE) on motivation to continue (Study 5).

Interaction of mindset and progress steadiness on intention to quit. As predicted, and as illustrated in Figure 6, a two-way interaction emerged, $F(1,566) = 28.23, p < .001$ ($\eta_p^2 = .048$). Simple effects analyses revealed that the effect of progress steadiness was significant within the SE Mindset condition, $F(1, 566) = 116.81, p < .001$: Those who imagined unsteady weight loss reported more intention to quit ($M = 3.50, SD = 1.71$) than did those who imagined steady weight loss ($M = 1.79, SD = .93$). However, as predicted, within the UE Mindset condition, the effect of progress steadiness was weaker (although still significant), $F(1, 566) = 9.01, p = .003$: Those who imagined unsteady weight loss reported more intention to quit ($M = 2.73, SD = 1.40$) than did those who imagined steady weight loss ($M = 2.23, SD = 1.31$), but the difference between conditions was smaller.

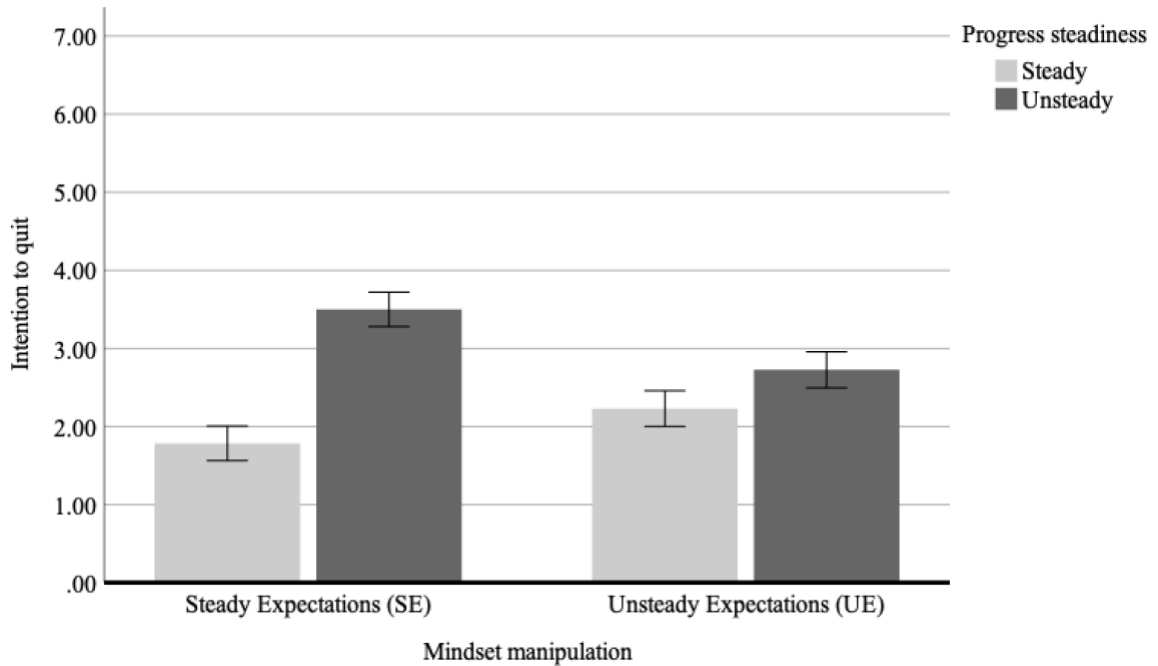


Figure 6: The effect of weight loss progress (steady vs. unsteady) and mindset intervention (SE vs. UE) on intention to quit (Study 5).

2.6.3 Discussion

Study 5's findings supported our predictions: When participants were exposed to the idea that unsteady goal progress should be expected and is therefore normal and good, the negative effects of experiencing unsteady progress were reduced.

2.7 Supplemental Studies

2.7.1 Pilot Study 1

Pilot Study 1 examined people's expectations of goal progress steadiness. We predicted that on average, people expect goal progress to be steady.

2.7.1.1 Methods

2.7.1.1.1 Participants

We collected data from 97 participants on the CloudResearch platform (61 men, 36 women; mean age = 38.12 years, $SD = 10.73$; 77.3% White, 8.2% Black, 7.2% Asian, 5.2% Latinx, 1.0% Native American, 1.0% Other).

2.7.1.1.1 Procedure and materials

Using four items, participants rated their expectations about goal steadiness: “When pursuing a weight loss goal of losing weight, I expect my progress to be...; When pursuing a reading goal of reading more books, I expect my progress to be...; When pursuing a savings goal of saving more money, I expect my progress to be...; When pursuing a work goal completing more projects at work, I expect my progress to be...” on a scale from 1 (*Extremely unsteady*) to 7 (*Extremely steady*). The midpoint 4 for both items was “Neither unsteady nor steady.”

2.7.1.2 Results

A one-sample t -test on the expectations items was used to determine if participants’ response different significantly from 4 (i.e., participants expect their progress to be neither unsteady nor steady). The composite of all four items averaged together ($M = 4.95$, 95% CI [4.76, 5.13], $SD = .93$) was significantly higher than the midpoint of the scale, indicating that participants expect their goal progress to be relatively steady, $t(96) = 10.07$, 95% CI [.76, 1.13], $p < .001$, $d = 1.02$. All items were also significant individually: The weight loss item ($M = 4.66$, 95% CI [4.39, 4.93], $SD = 1.34$) was significantly higher than the midpoint of the scale, $t(96) = 4.86$, 95% CI [.39, .93], $p < .001$, $d = .49$, the reading item ($M = 5.03$, 95% CI [4.76, 5.30], $SD = 1.34$) was significantly higher than the midpoint of the scale, $t(96) = 7.57$, 95% CI [.76, 1.30], $p < .001$, $d = .77$, the savings item ($M = 6.14$, 95% CI [4.63, 5.23], $SD = 1.49$) was significantly

higher than the midpoint of the scale, $t(96) = 6.14$, 95% CI [.63, 1.23], $p < .001$, $d = .62$, and the work progress item ($M = 5.16$, 95% CI [4.93, 5.40], $SD = 1.16$) was significantly higher than the midpoint of the scale, $t(96) = 9.88$, 95% CI [.93, 1.40], $p < .001$, $d = 1.00$.

2.7.1.3 Discussion

Pilot Study 1 offered support for our assumption that individuals expect steadiness during goal progress.

2.7.2 Pilot Study 2

The Pilot Study examined people's views of unsteady (vs. steady) progress as undesirable.

2.7.2.1 Methods

2.7.2.1.1 Participants

We collected data from 99 participants on the CloudResearch platform (56 men, 43 women; mean age = 39.20 years, $SD = 12.16$; 72.7% White, 12.1% Black, 11.1% Asian, 3.0% Latinx, 1.0% Pacific Islander).

2.7.2.1.1 Procedure and materials

Participants reported their opinions on unsteady (vs. steady) progress using the following four items: Making unsteady progress (compared to steady progress) is “bad / undesirable / indicates that I am making unsatisfactory progress / means that my progress is inadequate,” on a scale from 1 (*Strongly disagree*) to 7 (*Strongly agree*). The midpoint 4 for both items was “Neither agree nor disagree.”

2.7.2.2 Results

A one-sample t -test on the expectations items was used to determine if participants' response different significantly from 4 (i.e., neither agree nor disagree). The composite of all four

items averaged together ($M = 4.72$, 95% CI [4.44, 5.01], $SD = 1.45$) was significantly higher than the midpoint of the scale, indicating that participants reported making unsteady progress compared to steady progress as undesirable, $t(98) = 4.98$, 95% CI [4.44, 5.01], $p < .001$, $d = .501$. All items were also significant individually: The first item ($M = 4.65$, 95% CI [4.32, 4.97], $SD = 1.64$) was significantly higher than the midpoint of the scale, $t(98) = 3.91$, 95% CI [.32, .97], $p < .001$, $d = .39$, the second item ($M = 4.99$, 95% CI [4.70, 5.28], $SD = 1.46$) was significantly higher than the midpoint of the scale, $t(98) = 6.75$, 95% CI [.70, 1.28], $p < .001$, $d = .68$, the third item ($M = 4.61$, 95% CI [4.28, 4.93], $SD = 1.62$) was significantly higher than the midpoint of the scale, $t(98) = 3.73$, 95% CI [.28, .93], $p < .001$, $d = .38$, and the fourth item ($M = 4.66$, 95% CI [4.31, 5.00], $SD = 1.75$) was significantly higher than the midpoint of the scale, $t(98) = 3.74$, 95% CI [.31, 1.00], $p < .001$, $d = .38$.

2.7.2.3 Discussion

Pilot Study 2 offered support for our assumption that individuals think unsteady progress is bad and undesirable compared to steady progress.

2.7.3 Pilot Study 3

Pilot Study 3 tested our assumption that people do indeed make unsteady progress on their real-life goals. Specifically, we examined if actual progress is indeed more variable than expected progress. To do so, we examined the variability of actual and expected progress.

2.7.3.1 Methods

2.7.3.1.1 Participants

We compare data about actual progress from an archival dataset (from a study collected in 2009), to data about expected progress from a new dataset. Data on actual progress comes from a group who was surveyed at four different time points with four weeks in between each time

point. Students were recruited from posters around a university campus as part of a larger longitudinal study of dating couples. 278 students completed at least part of the study. We excluded 110 participants who did not complete all four surveys because we needed progress updates from all four time points to calculate progress variability and compare it to expected variability. We also excluded 2 participants who reported nonsensical responses (i.e., who said they made more than 100% percent progress in any time point). Therefore, we were left with a final sample of 166 students (79 men, 87 women; mean age = 20.86 years, SD = 2.38; 59.0% Caucasians, 27.1% Asian Canadians, 1.8% other Asians, 2.4% South Asian, 1.2% Middle Eastern / Arab, 3.6% mixed, 1.2% Africans, 1.2% Hispanics, and 0.6% Native).

The second group of participants reported expected progress on important goals. We aimed to recruit 166 participants total from CloudResearch to match the number of participants in the initial group of students who reported their actual progress. Our final sample consisted of 165 participants (94 men, 71 women; mean age = 40.60 years, SD = 12.29; 78.9% White, 10.5% Black, 4.7% Asian, 1.2% Latinx, 0.6% Native American, 0.6% Other).

2.7.3.1.1 Procedure and materials

Participants reporting on actual progress at time 1 reported on their three most important goals by filling out the following prompts: “My most important goal for the next few months is __,” “My second most important goal for the next few months is __,” and “My third most important goal for the next few months is __.” Afterwards, at three follow-up time points which occurred every four weeks, we reminded them of their stated goals (e.g., “You said your most important goal for the next few months was __”) and asked them to fill out the following prompt for each goal: “As of today, I have progressed __ percent toward achieving this goal (0% means you’ve made no progress at all; 100% means you’ve achieved this goal completely.”

In contrast, participants reporting on expected progress read, “Approximately 200 college students were asked about their most important goals, and then once a month, asked to report on their cumulative progress out of 100. Please enter the cumulative percentage you expect college students to complete at each of the following time points: Starting month, after month 1, after month 2, and after month 3.

2.7.3.2 Results

Because participants reported cumulative progress, rather than progress made in each period, we first calculated the *monthly* progress by subtracting the previous month’s total progress from the current month’s total progress, for all three goals. For example, if a student reported cumulative progress of 10%, 20%, 60%, then 90%, their monthly progress would be 10% (from starting month to month 1), 40% (from month 1 to month 2), and 30% (from month 2 to month 3). If a student made 20%, 40%, 60%, then 80% progress, their monthly progress would be 20% each time.

To explore whether there was variation in participants’ actual monthly progress, the mean within-person standard deviation was computed for the first, second, and third important goals, and for expected monthly progress. Table 2 details the results of the comparisons for the mean within-person standard deviations. Within-person standard deviations were determined by calculating the standard deviation of monthly progress for each goal for each individual across all time points.

Table 2: Comparison of Mean Within-Person Standard Deviations: How Much Individuals Tended to Vary in Expected and Actual Goal Progress (Pilot Study 3)

	Within-person <i>SD</i> (<i>mean</i>)	Within-person <i>SD</i> (<i>SD</i>)	Minimum within-person <i>SD</i> ^a	Maximum within-person <i>SD</i>	Percentile of within-person <i>SD</i>		
					25 th	50 th	75 th
Actual progress of most important goal	20.40	17.02	0 (8)	101.04	8.05	15.00	30.00
Actual progress of second most important goal	21.85	16.80	0 (15)	72.17	10.00	17.56	30.56
Actual progress of third most important goal	21.67	18.00	0 (11)	100.00	7.64	18.24	30.45
Expected progress	8.30	9.71	0 (39)	69.29	.58	5.77	11.55

Note. For instance, a within-person *SD* of zero indicates that an individual reported the same amount of progress from the previous day to the next day.

^a Values in parentheses give the number of individuals who reported no variation in reported monthly progress amount.

The mean within-person *SD* for actual monthly progress for the most important goal was 20.40, for the second most important goal was 21.85, and for the third most important goal was 21.67, compared to 8.30 for the expected monthly progress. The *SD* of the within-person *SD* for actual monthly progress for the most important goal was 17.02, for the second most important goal was 16.80, and for the third most important goal was 18.00, compared to 9.71 for the expected monthly progress. The within-person *SD* for actual monthly progress ranged from 0 to 101.04 for the most important goal, 0 to 72.17 for the second most important goal, and 0 to 100.00 for the third most important goal, compared to the expected monthly progress from 0 to 69.29. Also, more participants predicted zero variability (39) than experienced it (8, 15, and 11). Finally, the percentiles of within-person *SD* show that the within-person *SD* of actual monthly progress are higher at each percentile (8.05, 15.00, and 30.00 for the most important goal; 10.00, 17.56, and 30.56 for the second most important goal; 7.64, 18.24, and 30.45 for third most important goal for the 25th, 50th, and 75th percentile respectively) compared to the within-person

SD of expected monthly progress (6.58, 5.77, and 11.55 for the 25th, 50th, and 75th percentile respectively).

Figures 7, 8, and 9 display actual monthly progress for the most, second most, and third most important goal respectively. Figure S4 displays the expected monthly progress.

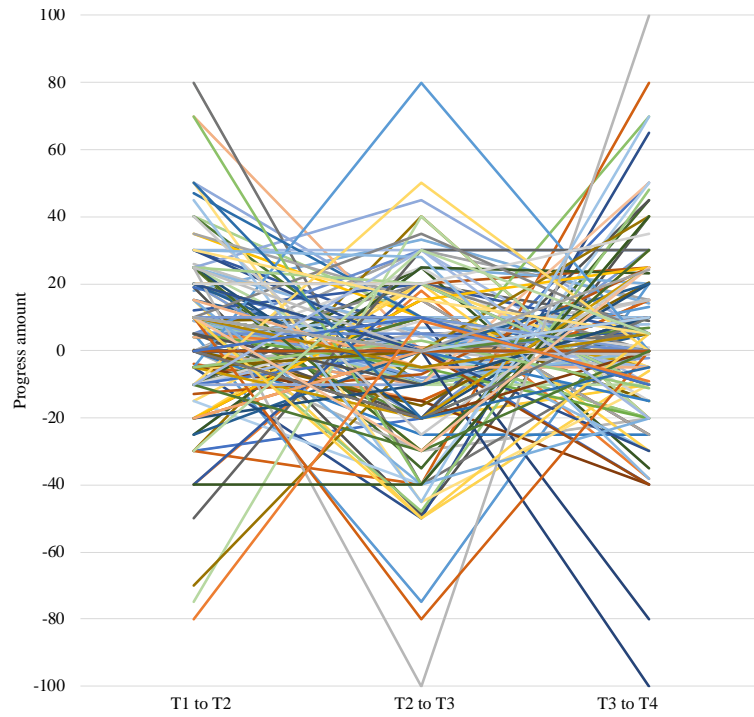


Figure 7: Actual monthly progress for the most important goal (Pilot Study 3).

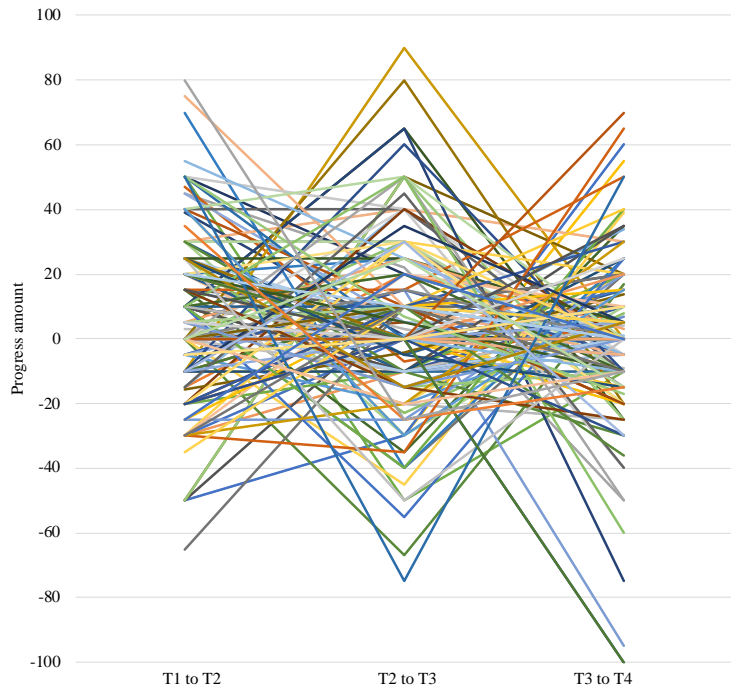


Figure 8: Actual monthly progress for the second most important goal (Pilot Study 3).

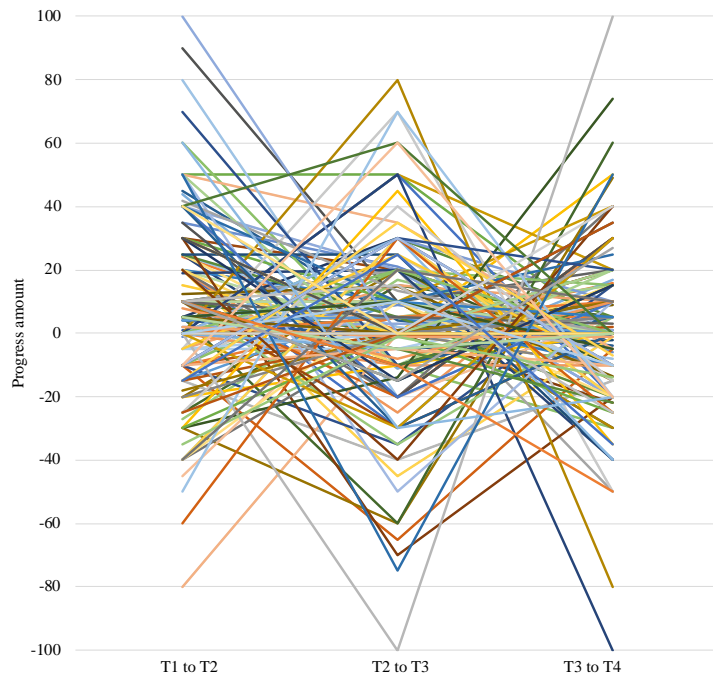


Figure 9: Actual monthly progress for the third most important goal (Pilot Study 3).

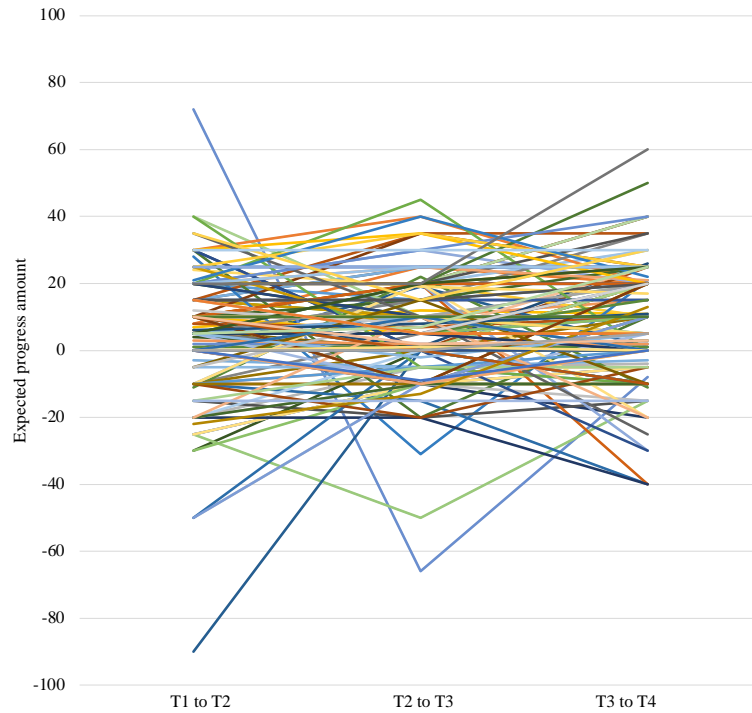


Figure 10: Expected monthly progress (Pilot Study 3).

2.7.3.3 Discussion

Pilot Study 3 offered support for our speculation that actual progress is indeed more variable than expected progress.

2.7.4 Study S1

Study S1 examined the hypotheses in the context of a weight loss goal vignette. Again, we predicted that participants who imagined making unsteady goal progress (vs. steady goal progress) would report less sense of accomplishment, less motivation to continue, and more intention to quit.

2.7.4.1 Methods

2.7.4.1.1 Participants

Power calculation using G*Power was performed before the start of data collection based on an effect size obtained from a prior study that investigated the effect of this vignette on our dependent variables ($f = .31$). Power calculations suggested that a sample of a minimum of 134 participants (minimum 67 participants per condition) would provide approximately 95% power to detect an effect of this size or larger. We collected 200 participants total (100 participants per condition). Our final sample consisted of 200 participants from CloudResearch (94 men, 105 women, 1 other; mean age = 37.85 years, $SD = 10.32$; 70.0% White, 14.0% Black, 8.5% Asian, 4.0% Latinx, 0.5% Native American, 3.0% Other). No participants were excluded, as we had not pre-registered any exclusion rules.

2.7.4.1.1 Procedure and materials

The study was preregistered at https://aspredicted.org/BNK_MLH. In this between-subjects study, participants were asked to “imagine that you have a weight loss goal of 6 pounds over the next 12 weeks.” Then, they were assigned one of two conditions – steady ($N = 101$) or unsteady ($N = 99$) condition. Participants in the steady condition read the following statements, one appearing sequentially after the other after participants pressed enter:

After week 1, you have lost 0.5 pounds.

After week 2, you have lost an additional 0.5 pounds, so you have lost 1 pound total.

After week 3, you have lost an additional 0.5 pounds, so you have lost 1.5 pounds total.

After week 4, you have lost an additional 0.5 pounds, so you have lost 2 pounds total.

After week 5, you have lost an additional 0.5 pounds, so you have lost 2.5 pounds total.

After week 6, you have lost an additional 0.5 pounds, so you have lost 3 pounds total.

Participants in the steady condition read the following statements, one after another:

After week 1, you have lost 1.5 pounds.

After week 2, you have lost 0 pounds, so you have lost 1.5 pounds total.

After week 3, you have gained 0.5 pounds, so you have lost 1 pound total.

After week 4, you have lost an additional 3 pounds, so you have lost 4 pounds total.

After week 5, you have lost 0 pounds, so you have lost 4 pounds total.

After week 6, you have gained 1 pound, so you have lost 3 pounds total.

The order in which the progress units were presented in the unsteady condition were randomized, to ensure that effects were not driven by any particular order (e.g., ending on a good week; as in Studies 1a and 1b). Afterwards, participants in both conditions read, “You have 6 more weeks to go and 3 more pounds to lose to meet your goal weight. As a mid-point check-in, how do you feel?” It is crucial to note that after six weeks, participants in both the steady and unsteady conditions had lost 3 pounds. Participants then completed the measures as listed below (all measured on the scale, 1 = Strongly disagree, 7 = Strongly agree).

Manipulation check. Participants responded to two manipulation check items (e.g., “In the vignette, so far, I have made steady (i.e., steady) goal progress,” and “In the vignette, so far, I have made unsteady (i.e., unsteady) goal progress.”).

Sense of accomplishment. Participants’ sense of accomplishment was measured using three items (e.g., “I feel accomplished after seeing my progress.”; $\alpha = .95$; see Appendix A for all items for all scales).

Motivation to continue. Participants indicated their motivation to continue pursuing this weight loss goal using three items (e.g., “I feel motivated to continue losing weight.”; $\alpha = .94$).

Intention to quit. Intention to quit was measured using three items (e.g., “I could see myself quitting now.”; $\alpha = .96$).

2.7.4.2 Results

For all measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 6.55, SD = .62$) than did those in the unsteady condition ($M = 3.52, SD = 1.96$); $F(1, 198) = 221.04, p < .001$ ($\eta^2 = .527$). Participants in the unsteady condition reported having made more unsteady progress ($M = 4.80, SD = 1.73$) than did those in the steady condition ($M = 1.88, SD = .84$); $F(1, 198) = 231.03, p < .001$ ($\eta^2 = .538$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 4.90, SD = 1.26$) than did those in the steady condition ($M = 6.02, SD = .81$); $F(1, 198) = 56.67, p < .001$ ($\eta^2 = .223$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 5.53, SD = 1.13$) than did those in the steady condition ($M = 6.34, SD = .76$); $F(1, 198) = 35.88, p < .001$ ($\eta^2 = .153$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 2.97, SD = 1.53$) than did those in the steady condition ($M = 2.15, SD = 1.19$); $F(1, 198) = 17.93, p < .001$ ($\eta^2 = .083$).

2.7.4.3 Discussion

Study S1 replicated the effects of Study 1a in the manuscript using a weight loss goal vignette. As predicted, participants who imagined making unsteady progress reported lower sense of accomplishment, less motivation to continue, and more intention to quit.

2.7.5 Study S2

Study S2 examined the hypotheses in the context of a work task goal. Again, we predicted that participants who imagined making unsteady goal progress (vs. steady goal progress) would report less sense of accomplishment, less motivation to continue, and more intention to quit.

2.7.5.1 Methods

2.7.5.1.1 Participants

Power calculation using G*Power was performed before the start of data collection based on an effect size obtained from a prior study that investigated the effect of this manipulation on our dependent variables ($f = .12$). Power calculations suggested that a sample of a minimum of 560 participants (minimum 280 participants per condition) would provide approximately 80% power to detect an effect of this size or larger. Our final sample consisted of 560 participants from CloudResearch (290 men, 268 women, 2 other; mean age = 41.14 years, $SD = 12.91$; 74.8% White, 11.1% Black, 6.4% Asian, 5.2% Latinx, 1.1% Native American, 0.5% Pacific Islander, 0.9% Other). No participants were excluded, as we had not pre-registered any exclusion rules.

2.7.5.1.1 Procedure and materials

The study was preregistered at https://aspredicted.org/N3D_4HV. Study S2's design was identical to that of Study S1, except participants were asked to “imagine that you are an employee at S. S. Corp,” and “You have a goal of completing 24 small but important tasks over the next 12 weeks.” As in Study S1, they were assigned one of two conditions – steady ($N = 272$) or unsteady ($N = 288$). Participants in the steady condition read the following statements, again one after another:

After week 1, you have completed 2 tasks.

After week 2, you have completed 2 additional tasks, so you have completed 4 tasks total.

After week 3, you have completed 2 additional tasks, so you have completed 6 tasks total.

After week 4, you have completed 2 additional tasks, so you have completed 8 tasks total.

After week 5, you have completed 2 additional tasks, so you have completed 10 tasks total.

After week 6, you have completed 2 additional tasks, so you have completed 12 tasks total.

Participants in the unsteady condition read the following statements, one after another:

After week 1, you have completed 2 tasks.

After week 2, you have completed 1 additional task, so you have completed 3 tasks total.

After week 3, you have completed 4 additional tasks, so you have completed 7 tasks total.

After week 4, you have completed 1 additional task, so you have completed 8 tasks total.

After week 5, you have completed 3 additional tasks, so you have completed 11 tasks total.

After week 6, you have completed 1 additional task, so you have completed 12 tasks total.

The order in which the progress units were presented in the unsteady condition were again randomized (as in Studies 1a and 1b). Afterwards, participants in both conditions read, “You have 6 more weeks to go and 12 more tasks to complete to meet your task completion goal. As a mid-point check-in, how do you feel?” It is crucial to note that after six weeks, participants in both the steady and unsteady condition had completed an equal number of 12 tasks in 6 weeks. Participants then completed the measures as listed below (all measured on the scale, 1 = Strongly disagree, 7 = Strongly agree).

Manipulation check, sense of accomplishment, motivation to continue, and intention to quit. Participants responded to the same manipulation check items, sense of accomplishment items ($\alpha = .93$), motivation to continue items ($\alpha = .92$), and intention to quit items ($\alpha = .96$) as in Study S1, with wording modified to reflect a work task goal.

2.7.5.2 Results

Again, for all measures, we performed a one-way analysis of variance (ANOVA).

Manipulation check. The manipulation worked as intended. Participants in the steady condition reported having made more steady progress ($M = 6.33, SD = .83$) than did those in the unsteady condition ($M = 4.94, SD = 1.65$); $F(1, 558) = 156.19, p < .001$ ($\eta^2 = .219$). Participants in the unsteady condition reported having made more unsteady progress ($M = 3.84, SD = 2.04$) than did those in the steady condition ($M = 2.34, SD = 1.46$); $F(1, 558) = 98.80, p < .001$ ($\eta^2 = .150$).

Sense of accomplishment. As predicted, participants in the unsteady condition reported lower sense of accomplishment ($M = 5.42, SD = 1.12$) than did those in the steady condition ($M = 5.89, SD = .83$); $F(1, 558) = 31.18, p < .001$ ($\eta^2 = .053$).

Motivation to continue. As predicted, participants in the unsteady condition reported less motivation to continue ($M = 5.95, SD = .91$) than did those in the steady condition ($M = 6.17, SD = .82$); $F(1, 558) = 8.95, p = .003$ ($\eta^2 = .016$).

Intention to quit. As predicted, participants in the unsteady condition reported greater intention to quit ($M = 2.94, SD = 1.71$) than did those in the steady condition ($M = 2.55, SD = 1.54$); $F(1, 558) = 8.35, p = .004$ ($\eta^2 = .015$).

2.7.5.3 Discussion

Study S2 replicated the effects of Study 1a and S1 using a work task goal. As predicted, participants who imagined making unsteady progress reported lower sense of accomplishment, less motivation to continue, and more intention to quit, even when they did not experience no progress or reverse progress.

3. General Discussion

Western culture mythologizes people like Thomas Edison, who persevered through progress unsteadiness while trying to invent the lightbulb (he famously said, “I have not failed, I’ve just found 10,000 ways that won’t work”). But for every person who persevered through unsteady progress, there are surely countless more that felt demotivated and gave up – and those are the people whose stories we never hear.

The present research considers a novel facet of goal progress – progress steadiness – in shaping motivation. Across six studies, results indicate that despite goal progress being equal in amount and speed, unsteady (vs. steady) progress decreases people’s sense of accomplishment and motivation to continue, and increases quitting.

Three pilot studies found that goal pursuers expect progress to be steady (Pilot Study 1), believe that making unsteady progress is bad (Pilot Study 2), and do indeed make unsteady progress in their real-life goals, more so than others would predict (Pilot Study 3). Study 1a used a savings goal vignette to demonstrate that individuals report worse motivation when experiencing unsteady savings progress. Study 1b replicated this pattern in a weight loss vignette and controlled for number of failure experiences. Study 2 revealed similar results when participants reported on a real-life goal they are currently pursuing. Study 3 found the same effects in a real-time behavioral task and demonstrated the role of self-efficacy in mediating this effect. Study 4 demonstrated that goal pursuers who experienced unsteady progress in a real-time task chose to avoid this task in the future, and were even willing to forgo a higher payout to do so. Finally, Study 5 showed the power of expectations about steadiness. When participants read an article claiming there were benefits to unsteady progress, their motivation was protected when they experienced unsteady progress.

3.1 Implications for Goal Progress and Motivation Literatures

The present work it contributes to the basic theory and understanding of self-regulation by highlighting a new and consequential aspect of goal pursuit. The negative effects of progress unsteadiness are likely a common problem: Many goal pursuers experience less steadiness than they expect in everyday goal pursuit (Buehler & Griffin, 2003; Newby-Clark et al., 2000; also see pilot studies), and our findings suggest these experiences shape motivation. Negative reactions to progress unsteadiness may contribute to the difficulty many goal pursuers have in sticking to ongoing important goals, like financial and health goals (Marlatt & Kaplan, 1972; Norcross & Vangarelli, 1988; Rogers et al., 2015; Webb & Sheeran, 2006), and is thus important to understand. Indeed, the pattern or trajectory of progress may be just as meaningful a variable in predicting motivation as its amount or speed, two very well studied characteristics in the field (Chang et al., 2009; Huang & Zhang, 2011; Kivetz et al., 2006; Nunes & Drèze, 2006).

As one predictor of goal quitting, steadiness is also important to understand for practical and theoretical reasons. Giving up on personal goals poses a threat to one's identity (Carver & Scheier, 1998, 2005). Indeed, abandoning personal goals "shake[s] one's self-image to its core" (Carver & Scheier, 2005, p. 536). In addition to negative psychological consequences, quitting also obviously leads to negative goal outcomes in important domains like health, relationships, and work performance (Brandstätter & Bernecker, 2022). Therefore, it is important to understand the facets of goal progress that lead to goal quitting. While individual difference predictors of goal disengagement such as depressive mood (Wrosch & Miller, 2009) and low self-awareness (Kreibich et al., 2022) have been shown to lead to quitting, here, our findings reveal that the unsteadiness of goal progress can also lead to low motivation to continue and ultimately quitting.

3.2 Implications for the Mindset Literature

Our findings add to the mindset literature by demonstrating the role of a new aspect of mindsets in mitigating the adverse motivational effects of progress unsteadiness. Our manipulation for encouraging an Unsteady Expectations Mindset builds directly on the methods and theory of the literature on mindset theory (Dweck & Leggett, 1988). Prior mindset interventions have sought to change goal pursuers' beliefs about the malleability of their own intelligence, skills, and abilities (e.g., Blackwell et al., 2007; Mrazek et al., 2018). Our intervention aims to change goal pursuers' expectations around goal pursuit itself. It is possible that this intervention could be used to complement existing mindset approaches, and could also perhaps be helpful in intervention studies aiming to help disadvantaged students cope with challenging academic environments (Blackwell et al., 2007; Broda et al., 2018; Claro et al., 2016; Yeager et al., 2016). If students expect to see ups and downs in their academic progress, our initial findings tentatively suggest this may help protect their motivation and desire to persist through obstacles.

3.3 Open Questions and Future Directions

Our studies tested hypotheses about progress steadiness affecting motivation and mindsets that can offset motivational damage. Limitations include (a) the lack of consideration of individual difference moderators, (b) the lack of investigation into how progress steadiness affects performance, (c) the lack of inquiry into how these effects might apply for less measurable goals, (d) generalizability concerns.

First, although beyond the scope of the present paper, individual differences could moderate the effects of progress steadiness on motivation. For one, individuals who are maladaptive perfectionists (Enns et al., 2002), who have higher extrinsic (vs. intrinsic) motivation

(Vallerand, 2000), who are less optimistic (Tenney et al., 2019), who have low levels of grit (Duckworth et al., 2007), and who have higher fixed (vs. incremental) mindset (Schroder et al., 2017) are known to report worse outcomes and less persistence after experiencing setbacks. Testing if individuals high on these traits especially report negative outcomes could reveal if some individuals are more prone to experiencing the adverse motivational outcomes of encountering unsteady progress.

Second, another open question concerns how a reduction in motivation ultimately affects performance. Indeed, prior research has shown that lower self-efficacy leads to worse performance because they do not have the assurance in their capabilities and view difficult tasks and challenges as threats that need to be avoided (Komarraju & Nadler, 2013; Martin & Gill, 1991; Stajkovic & Luthans, 1998). However, this relationship has been contested (Vancouver et al., 2001). In our studies, we do not observe any consistent differences in accuracy scores on the visual pattern task for Studies 3 and 4 (see Appendix C for details). However, differences in accuracy score may have been undetected in our studies because the visual pattern task we presented to the participants was primarily a cognitive skills-based task, rather than an effort-based task, and was extremely difficult. Our study results do not rule out the possibility that we may see differences in accuracy for an effort-based task, where participants can choose to persevere on a goal. In such case, progress unsteadiness may lower individuals' feelings of self-efficacy, which may reduce the amount of effort they exert and ultimately lead to worse performance.

Third, future research can also test if other kinds of immeasurable goals are less susceptible to the harmful motivational effects or progress unsteadiness because expectations of progress and actual progress markers are less clear. For example, a weight loss goal has clear markers of goal progress as measured by the number of pounds lost. A reading goal has clear

markers of goal progress as measured by the number of pages read. Unlike these goal domains, relationship progress markers are less clear. For example, socially accepted norms and guidelines for romance are always changing (Kidd et al., 2012); thus, markers of relationship success and progress are fuzzier. Therefore, further research can examine if our effects hold with less measurable goals.

Finally, given that all studies included US samples, results may differ in other populations. Future research could also ask if there are certain contexts – cultural or developmental – that lead people to adopt these beliefs more readily. Culturally, western cultures are shown to have a higher uncertainty orientation where they cope with uncertainty by gaining clarity and attaining new information, whereas eastern cultures are shown to have a higher certainty orientation where they manage uncertainty by maintaining clarity and adhering to what is already known (Shuper et al., 2004; Sorrentino & Roney, 2000). Thus, individuals who have grown up with eastern cultural ideals may find it easier to maintain high motivation in the face of irregular progress and adopt unsteady mindsets. Additionally, the US values hard work, productivity, and consistent work ethic; therefore, Americans may be more susceptible to feeling negative after experience unsteady progress since they highly uphold values like diligence and consistency (Furnham et al., 1993). In countries where the Protestant Work Ethic is less endorsed on a national level, our effect may be weaker. Also, children whose caregivers encourage autonomy and self-discovery perceive uncertain circumstances as an opportunity to learn more about themselves and the environment rather than as a threat (Sorrentino et al., 1990). In contrast, anxious parenting behaviors predict children’s intolerance of uncertainty during developmental periods (Moore et al., 2004; Siqueland et al., 1996; Zlomke & Young, 2009). Therefore, individuals whose parents have readily encouraged self-determination may be more resilient in the face of unsteady progress.

4. Conclusion

The nature of goal progress plays a pivotal role in influencing motivational outcomes. Six studies show that motivation takes a hit in the face of progress unsteadiness. Given that actual everyday goal pursuit is bumpy, it would help goal pursuers to change expectations around what goal progress should look like. Instead of “slow and steady wins the race,” goal pursuers could remind themselves that “taking a step backward after taking a step forward is not a disaster, it’s a cha-cha,” or more seriously, “the path to achievement is seldom a straight road; embrace the curves and bumps along the way.”

Appendix A

All items were measured on a scale from 1 (Strongly disagree) to 7 (Strongly agree).

Study 1a

Manipulation check

1. In the vignette, so far, I have made steady (i.e., linear) progress towards my savings goal.
2. In the vignette, so far, I have made unsteady (i.e., non-linear) progress towards my savings goal.

Sense of accomplishment

1. I feel accomplished after seeing my progress.
2. I feel a sense of achievement after seeing my progress.
3. I feel like I have made headway after seeing my progress.

Motivation to continue

1. I feel motivated to continue saving money.
2. I feel driven to continue saving money.
3. I feel encouraged to keep saving money.

Intention to quit

1. I could see myself quitting now.
2. I may give up soon on saving money.
3. There is a chance I stop pursuing my savings goal.

Study 1b & 5

Manipulation check

1. In the vignette, so far, I have made steady (i.e., linear) goal progress.
2. In the vignette, so far, I have made unsteady (i.e., non-linear) goal progress.

Sense of accomplishment

1. I feel accomplished after seeing my progress.
2. I feel a sense of achievement after seeing my progress.
3. I feel like I have made headway after seeing my progress.

Motivation to continue

1. I feel motivated to continue losing weight.
2. I feel driven to continue losing weight.
3. I feel encouraged to keep losing weight.

Intention to quit

1. I could see myself quitting now.
2. I may give up soon on losing weight.
3. There is a chance I stop pursuing my goal of weight loss.

Study 2

Manipulation check

1. So far, I have made **steady** progress towards the goal I wrote about.
2. So far, I have made **unsteady** progress towards the goal I wrote about.

Sense of accomplishment

1. Based on the progress I've made so far on my goal, I feel accomplished.
2. Based on the progress I've made so far on my goal, I feel a sense of achievement.
3. Based on the progress I've made so far on my goal, I feel like I have made headway on my goal.

Motivation to continue

1. I feel motivated to continue pursuing my goal.
2. I feel driven to continue pursuing my goal.

3. I feel encouraged to keep pursuing my goal.

Intention to quit

1. If I were in a position where I could quit pursuing this goal, I could see myself quitting now.
2. If I were in a position where I could quit pursuing this goal, I may give up soon on my goal.
3. If I were in a position where I could quit pursuing this goal, there is a chance I stop pursuing my goal.

Studies 3 & 4

Manipulation check

1. So far, I have made steady (i.e., steady) progress towards the goal of earning a \$2 bonus (i.e., I have gotten a consistent number of problems correct each page).
2. So far, I have made unsteady (i.e., non-steady) progress towards the goal of earning a \$2 bonus (i.e., I have gotten an inconsistent number of problems correct each page).

Sense of accomplishment

1. I feel accomplished after seeing my progress.
2. I feel a sense of achievement after seeing my progress.
3. I feel like I have made headway after seeing my progress.

Motivation to continue

1. After seeing my progress so far, I feel encouraged to keep solving the remaining problems to get the \$2 bonus.
2. Based on my progression so far, I feel motivated to continue solving the remaining problems to strive for the \$2 bonus.

3. After getting feedback on how I've been doing so far, I feel more heartened to continue solving the remaining problems to receive the \$2 bonus.

Intention to quit

1. If I could stop now and receive the base pay plus a lower bonus of \$1 (even though I left the study half-way through), I could see myself quitting now.
2. If I could stop now and receive the base pay plus a lower bonus of \$1, I may give up soon on solving the rest of the problems.
3. If I could stop now and receive the base pay plus a lower bonus of \$1, there is a chance I stop pursuing the \$2 bonus.

Self-efficacy (only in Study 3)

1. I will be able to achieve the goal of winning the \$2 bonus that I have set for myself.
2. When facing this difficult task, I am certain that I will accomplish it.
3. I think I can obtain the outcome of winning the \$2 bonus which is important to me.
4. I believe I can succeed at this endeavor to which I set my mind to.
5. I will be able to successfully overcome this challenge.
6. I am confident that I can perform effectively on this task.
7. Compared to other people, I can do this task well to receive the bonus payment.
8. Even when the questions are tough, I can perform quite well enough to receive the bonus payment.

Study S1

Manipulation check

1. In the vignette, so far, I have made steady (i.e., linear) goal progress.
2. In the vignette, so far, I have made unsteady (i.e., non-linear) goal progress.

Sense of accomplishment

1. I feel accomplished after seeing my progress.
2. I feel a sense of achievement after seeing my progress.
3. I feel like I have made headway after seeing my progress.

Motivation to continue

1. I feel motivated to continue losing weight.
2. I feel driven to continue losing weight.
3. I feel encouraged to keep losing weight.

Intention to quit

1. I could see myself quitting now.
2. I may give up soon on losing weight.
3. There is a chance I stop pursuing my goal of weight loss.

Study S2

Manipulation check

1. In the vignette, so far, I have made steady (i.e., linear) goal progress.
2. In the vignette, so far, I have made unsteady (i.e., non-linear) goal progress.

Sense of accomplishment

1. I feel accomplished after seeing my progress.
2. I feel a sense of achievement after seeing my progress.
3. I feel like I have made headway after seeing my progress.

Motivation to continue

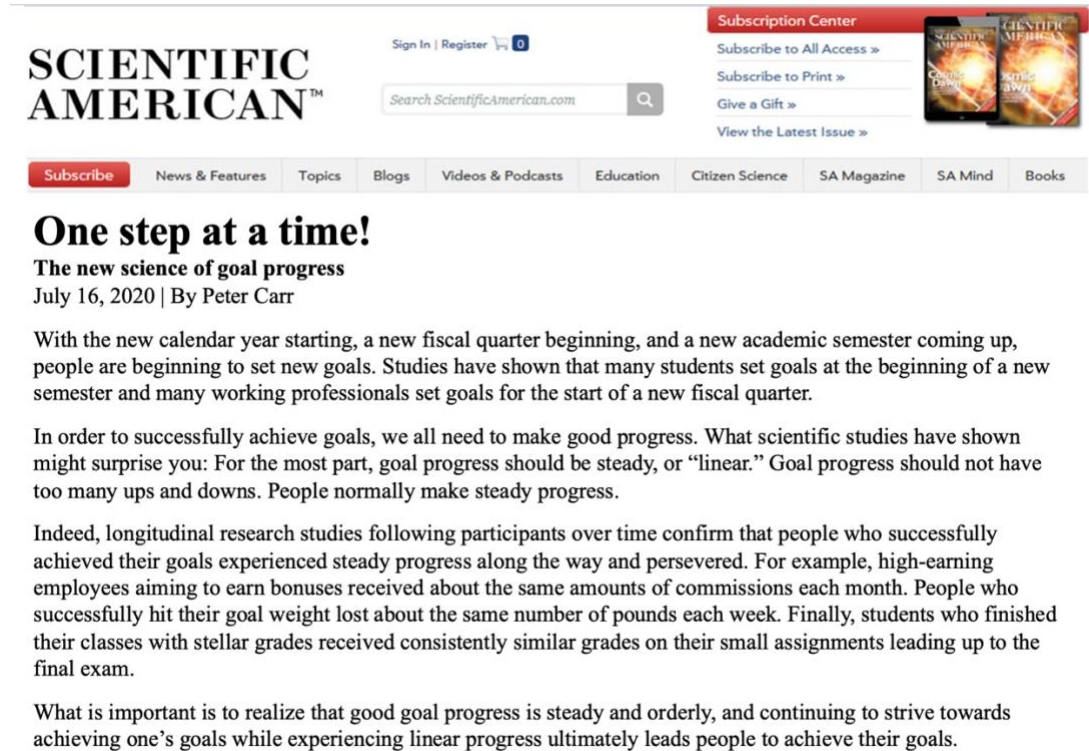
1. I feel motivated to continue completing tasks.
2. I feel driven to continue tackling tasks.
3. I feel encouraged to keep completing tasks.

Intention to quit

1. I could see myself quitting now.
2. I may give up soon on completing the tasks.
3. There is a chance I stop pursuing my goal of completing tasks.

Appendix B

Steady Expectations (SE) Mindset manipulation



The screenshot shows the top portion of the Scientific American website. At the top left is the logo "SCIENTIFIC AMERICAN™". To its right are links for "Sign In | Register" and a shopping cart icon with a "0" next to it. Below these is a search bar with the placeholder text "Search ScientificAmerican.com" and a magnifying glass icon. On the right side, there is a "Subscription Center" section with links for "Subscribe to All Access >", "Subscribe to Print >", "Give a Gift >", and "View the Latest Issue >". Below the search bar is a horizontal navigation menu with the following items: "Subscribe", "News & Features", "Topics", "Blogs", "Videos & Podcasts", "Education", "Citizen Science", "SA Magazine", "SA Mind", and "Books".

One step at a time!

The new science of goal progress
July 16, 2020 | By Peter Carr

With the new calendar year starting, a new fiscal quarter beginning, and a new academic semester coming up, people are beginning to set new goals. Studies have shown that many students set goals at the beginning of a new semester and many working professionals set goals for the start of a new fiscal quarter.

In order to successfully achieve goals, we all need to make good progress. What scientific studies have shown might surprise you: For the most part, goal progress should be steady, or “linear.” Goal progress should not have too many ups and downs. People normally make steady progress.

Indeed, longitudinal research studies following participants over time confirm that people who successfully achieved their goals experienced steady progress along the way and persevered. For example, high-earning employees aiming to earn bonuses received about the same amounts of commissions each month. People who successfully hit their goal weight lost about the same number of pounds each week. Finally, students who finished their classes with stellar grades received consistently similar grades on their small assignments leading up to the final exam.

What is important is to realize that good goal progress is steady and orderly, and continuing to strive towards achieving one’s goals while experiencing linear progress ultimately leads people to achieve their goals.

Unsteady Expectations (UE) Mindset manipulation

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Two steps forward, one step back!

The new science of goal progress
July 16, 2020 | By Peter Carr

With the new calendar year starting, a new fiscal quarter beginning, and a new academic semester coming up, people are beginning to set new goals. Studies have shown that many students set goals at the beginning of a new semester and many working professionals set goals for the start of a new fiscal quarter.

In order to successfully achieve goals, we all need to make good progress. What scientific studies have shown might surprise you: For the most part, goal progress should be unsteady, or “nonlinear.” Goal progress should have its ups and downs. People normally do not make steady progress.

Indeed, longitudinal research studies following participants over time confirm that people who successfully achieved their goals experienced unsteady progress along the way and persevered. For example, high-earning employees aiming to earn bonuses received different amounts of commissions each month. People who successfully hit their goal weight lost a fluctuating number of pounds each week. Finally, students who finished their classes with stellar grades tended to receive inconsistent grades on their small assignments leading up to the final exam.

What is important is to realize that good goal progress is unsteady and messy, and continuing to strive towards achieving one’s goals while experiencing nonlinear progress ultimately leads people to achieve their goals.

Appendix C

Exploratory Analysis: Task performance (Studies 3 and 4)

Study 3: Exploratory analysis: task performance. We had no a priori hypotheses for whether participants in either condition would outperform the other in terms of actual task performance. However, we performed a Poisson regression to explore if participants in either condition outperformed the other after receiving our false feedback. Since our dependent variable was count data (i.e., count of answers correct), we used Poisson regression for the analyses. The following analyses were pre-registered as exploratory analyses; therefore, results should be interpreted with caution. Results revealed that the total number of questions correct did not differ between the two conditions (steady: $M = 9.40$, $SD = 3.21$; unsteady: $M = 9.26$, $SD = 3.02$), $\beta = .02$, $SE = .04$, 95% Wald CI [-.06, .09], Wald $\chi^2(1) = .16$, $p = .687$. The results suggest that performance differences were unlikely to drive the effects of the manipulation on the dependent measures; indeed, a mediation analysis showed no indirect role for performance on sense of accomplishment: $b = .01$, $SE = .03$, 95% CI [-.05, .08], motivation to continue: $b = .01$, $SE = .03$, 95% CI [-.05, .08], nor intention to quit: $b = -.001$, $SE = .01$, 95% CI [-.03, .03]).

Study 4: Exploratory analysis: task performance. Again, we had no predictions about performance effects, and the following analyses were pre-registered as exploratory analyses; therefore, results should be interpreted with caution. We performed a Poisson regression to explore if participants in either condition outperformed the other after receiving our false feedback. Results demonstrated that the total number of questions correct did not differ between the two conditions (steady: $M = 6.60$, $SD = 3.33$; unsteady: $M = 6.76$, $SD = 3.26$), $\beta = -.02$, $SE = .03$, 95% Wald CI [-.08, .03], Wald $\chi^2(1) = .84$, $p = .359$. The results suggest that performance differences were unlikely to drive the effects of the manipulation on the dependent measures;

indeed, a mediation analysis showed no indirect role for performance on sense of accomplishment: $b = -.009$, $SE = .01$, 95% CI $[-.04, .01]$, motivation to continue: $b = -.01$, $SE = .02$, 95% CI $[-.05, .02]$, nor intention to quit: $b = .005$, $SE = .008$, 95% CI $[-.01, .02]$).

References

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, 50, 150–161.
- Bejan, A. (2018, August 27). In the Race of Life, the Tortoise Beats the Hare Every Time. *Duke News & Media*. <https://pratt.duke.edu/about/news/tortoise-hare>
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention. *Child Development*, 78(1), 246–263. <https://doi.org/10.1111/j.1467-8624.2007.00995.x>
- Blecharz, J., Horodyska, K., Zarychta, K., Adamiec, A., & Luszczynska, A. (2015). Intrinsic Motivation Predicting Performance Satisfaction in Athletes: Further Psychometric Evaluations of the Sport Motivation Scale-6. *Polish Psychological Bulletin*, 46(2), 309–319. <https://doi.org/10.1515/ppb-2015-0037>
- Bonezzi, A., Brendl, C. M., & Angelis, M. D. (2011). Stuck in the Middle. *Psychological Science*, 22(5), 607–612.
- Brandstätter, V., & Bernecker, K. (2022). Persistence and Disengagement in Personal Goal Pursuit. *Annual Review of Psychology*, 73(1), 271–299. <https://doi.org/10.1146/annurev-psych-020821-110710>
- Brawley, L. R., Rejeski, W. J., & King, A. (2003). Promoting physical activity for older adults: The challenges for changing behavior. *American Journal of Preventive Medicine*, 25(3), 172–183. [https://doi.org/10.1016/S0749-3797\(03\)00182-X](https://doi.org/10.1016/S0749-3797(03)00182-X)
- Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018). Reducing Inequality in Academic Success for Incoming College Students: A Randomized Trial of Growth Mindset and Belonging Interventions. *Journal of Research on Educational Effectiveness*, 11(3), 317–338. <https://doi.org/10.1080/19345747.2018.1429037>
- Brooks, A. W. (2014). Get excited: Reappraising pre-performance anxiety as excitement. *Journal of Experimental Psychology: General*, 143(3), 1144–1158. <https://doi.org/10.1037/a0035325>
- Brunstein, J. C. (1993). Personal Goals and Subjective Well-Being: A Longitudinal Study. *Journal of Personality and Social Psychology*, 65(5), 1006–1070.

- Buehler, R., & Griffin, D. (2003). Planning, personality, and prediction: The role of future focus in optimistic time predictions. *Organizational Behavior and Human Decision Processes*, 92(1–2), 80–90. [https://doi.org/10.1016/S0749-5978\(03\)00089-X](https://doi.org/10.1016/S0749-5978(03)00089-X)
- Bullock, J. G., Green, D. P., & Ha, S. E. (2010). Yes, but what's the mechanism? (Don't expect an easy answer). *Journal of Personality and Social Psychology*, 98(4), 550–558. <https://doi.org/10.1037/a0018933>
- Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological Review*, 97(1), 19–35. <https://doi.org/10.1037/0033-295X.97.1.19>
- Carver, C. S., & Scheier, M. F. (1998). *On the Self-Regulation of Behavior*. Cambridge University Press.
- Carver, C. S., & Scheier, M. F. (2005). Engagement, Disengagement, Coping, and Catastrophe. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 527–547). Guilford Publications.
- Cervone, D., Kopp, D. A., Schaumann, L., & Scott, W. D. (1994). Mood, self-efficacy, and performance standards: Lower moods induce higher standards for performance. *Journal of Personality and Social Psychology*, 67(3), 499–512. <https://doi.org/10.1037/0022-3514.67.3.499>
- Chang, C.-H. D., Johnson, R. E., & Lord, R. G. (2009). Moving Beyond Discrepancies: The Importance of Velocity as a Predictor of Satisfaction and Motivation. *Human Performance*, 23(1), 58–80. <https://doi.org/10.1080/08959280903400226>
- Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a New General Self-Efficacy Scale. *Organizational Research Methods*, 4(1), 62–83. <https://doi.org/10.1177/109442810141004>
- Cherian, J., & Jacob, J. (2013). Impact of Self Efficacy on Motivation and Performance of Employees. *International Journal of Business and Management*, 8(14), p80. <https://doi.org/10.5539/ijbm.v8n14p80>
- Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, 113(31), 8664–8668. <https://doi.org/10.1073/pnas.1608207113>
- Consiglio, C., Borgogni, L., Di Tecco, C., & Schaufeli, W. B. (2016). What makes employees engaged with their work? The role of self-efficacy and employee's perceptions of social context over time. *Career Development International*, 21(2), 125–143. <https://doi.org/10.1108/CDI-03-2015-0045>
- Crocker, J., Brook, A. T., Niiya, Y., & Villacorta, M. (2006). The Pursuit of Self-Esteem: Contingencies of Self-Worth and Self-Regulation. *Journal of Personality*, 74(6), 1749–1772. <https://doi.org/10.1111/j.1467-6494.2006.00427.x>

- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087–1101. <https://doi.org/10.1037/0022-3514.92.6.1087>
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia, PA: Psychology Press.
- Dweck, C. S. (2007). *The New Psychology of Success*. Random House.
- Dweck, C. S., & Leggett, E. L. (1988). A Social-Cognitive Approach to Motivation and Personality. *Psychological Review*, 95(2), 256–273.
- Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A View From Two Eras. *Perspectives on Psychological Science*, 14(3), 481–496. <https://doi.org/10.1177/1745691618804166>
- Enns, M. W., Cox, B. J., & Clara, I. (2002). Adaptive and maladaptive perfectionism: Developmental origins and association with depression proneness. *Personality and Individual Differences*, 33(6), 921–935. [https://doi.org/10.1016/S0191-8869\(01\)00202-1](https://doi.org/10.1016/S0191-8869(01)00202-1)
- Fiedler, K., Harris, C., & Schott, M. (2018). Unwarranted inferences from statistical mediation tests – An analysis of articles published in 2015. *Journal of Experimental Social Psychology*, 75, 95–102. <https://doi.org/10.1016/j.jesp.2017.11.008>
- Fishbach, A., & Dhar, R. (2005). Goals as Excuses or Guides: The Liberating Effect of Perceived Goal Progress on Choice. *Journal of Consumer Research*, 32(3), 370–377. <https://doi.org/10.1086/497548>
- Fishbach, A., Henderson, M. D., & Koo, M. (2011). Pursuing goals with others: Group identification and motivation resulting from things done versus things left undone. *Journal of Experimental Psychology: General*, 140(3), 520–534. <https://doi.org/10.1037/a0023907>
- Fishbach, A., Koo, M., & Finkelstein, S. R. (2014). Motivation Resulting from Completed and Missing Actions. In *Advances in Experimental Social Psychology* (Vol. 50, pp. 257–307). Elsevier. <https://doi.org/10.1016/B978-0-12-800284-1.00005-9>
- Fishbach, A., & Shah, J. Y. (2006). Self-control in action: Implicit dispositions toward goals and away from temptations. *Journal of Personality and Social Psychology*, 90(5), 820–832. <https://doi.org/10.1037/0022-3514.90.5.820>
- Fishbach, A., Zhang, Y., & Koo, M. (2009). The dynamics of self-regulation. *European Review of Social Psychology*, 20(1), 315–344. <https://doi.org/10.1080/10463280903275375>
- Franke-Ruta, G. (2013, October 24). The Tortoise, the Hare, and the Massachusetts Lesson for Obamacare. *The Atlantic*. <https://www.theatlantic.com/politics/archive/2013/10/the-tortoise-the-hare-and-the-massachusetts-lesson-for-obamacare/280849/>

- Furnham, A. (1984). The protestant work ethic: A review of the psychological literature. *European Journal of Social Psychology*, 14(1), 87–104. <https://doi.org/10.1002/ejsp.2420140108>
- Furnham, A., Bond, M., Heaven, P., Hilton, D., Lobel, T., Masters, J., Payne, M., Rajamanikam, R., Stacey, B., & Daalen, H. V. (1993). A comparison of Protestant work ethic beliefs in thirteen nations. *Journal of Social Psychology*, 133, 185–198.
- Gecas, V., & Schwalbe, M. L. (1983). Beyond the Looking-Glass Self: Social Structure and Efficacy-Based Self-Esteem. *Social Psychology Quarterly*, 46(2), 77. <https://doi.org/10.2307/3033844>
- Giner-Sorolla, R. (2016). Approaching a fair deal for significance and other concerns. *Journal of Experimental Social Psychology*, 65, 1–6. <https://doi.org/10.1016/j.jesp.2016.01.010>
- Gollwitzer, P. M., & Rohloff, U. B. (1999). The Speed of Goal Pursuit. In R. S. Wyer (Ed.), *Perspectives on Behavioral Self-Regulation: Advances in Social Cognition* (Vol. 12, pp. 147–159). Lawrence Erlbaum Associates.
- Gray, J. (2004). *Heresies: Against progress and other illusions*. Granta Books.
- Heatherton, T. F., Polivy, J., & Herman, C. P. (1991). Restraint, Weight Loss, and Variability of Body Weight. *Journal of Abnormal Psychology*, 100(1), 78–83.
- Heine, S. J., & Raineri, A. (2009). Self-Improving Motivations and Collectivism: The Case of Chileans. *Journal of Cross-Cultural Psychology*, 40(1), 158–163. <https://doi.org/10.1177/0022022108326193>
- Huang, S.-C., & Zhang, Y. (2011). Motivational Consequences of Perceived Velocity in Consumer Goal Pursuit. *Journal of Marketing Research*, 48(6), 1045–1056.
- Hull, C. L. (1932). The goal-gradient hypothesis and maze learning. *Psychological Review*, 39(1), 25–43. <https://doi.org/10.1037/h0072640>
- Hull, C. L. (1934). The rat's speed-of-locomotion gradient in the approach to food. *Journal of Comparative Psychology*, 17(3), 393–422. <https://doi.org/10.1037/h0071299>
- Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. Free Press.
- Johnson, R. E., Howe, M., & Chang, C.-H. (Daisy). (2013). The importance of velocity, or why speed may matter more than distance. *Organizational Psychology Review*, 3(1), 62–85. <https://doi.org/10.1177/2041386612463836>
- Kay, A. C., Gaucher, D., Napier, J. L., Callan, M. J., & Laurin, K. (2008). God and the government: Testing a compensatory control mechanism for the support of external systems. *Journal of Personality and Social Psychology*, 95(1), 18–35. <https://doi.org/10.1037/0022-3514.95.1.18>

- Kay, A. C., Sullivan, D., & Landau, M. J. (2015). Psychological importance of beliefs in control and order: Historical and contemporary perspectives in social and personality psychology. In M. Mikulincer, P. R. Shaver, E. Borgida, & J. A. Bargh (Eds.), *APA handbook of personality and social psychology: Vol. 1 Attitudes and social cognition* (pp. 309–337). American Psychological Association. <https://doi.org/10.1037/14341-010>
- Kay, A. C., Whitson, J. A., Gaucher, D., & Galinsky, A. D. (2009). Compensatory Control: Achieving Order Through the Mind, Our Institutions, and the Heavens. *Current Directions in Psychological Science*, 18(5), 264–268. <https://doi.org/10.1111/j.1467-8721.2009.01649.x>
- Kidd, B., Martin, M., & Martin, D. (2012). A Qualitative Study of the Role of Friendship in Late Adolescent and Young Adult Heterosexual Romantic Relationships. *Interpersona: An International Journal on Personal Relationships*, 6(1), 54–74. <https://doi.org/10.5964/ijpr.v6i1.104>
- Kivetz, R., Urminsky, O., & Zheng, Y. (2006). The Goal-Gradient Hypothesis Resurrected: Purchase Acceleration, Illusionary Goal Progress, and Customer Retention. *Journal of Marketing Research*, 43(1), 39–58. <https://doi.org/10.1509/jmkr.43.1.39>
- Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, 25, 67–72. <https://doi.org/10.1016/j.lindif.2013.01.005>
- Koo, M., & Fishbach, A. (2010). Climbing the goal ladder: How upcoming actions increase level of aspiration. *Journal of Personality and Social Psychology*, 99(1), 1–13. <https://doi.org/10.1037/a0019443>
- Koo, M., & Fishbach, A. (2012). The Small-Area Hypothesis: Effects of Progress Monitoring on Goal Adherence. *Journal of Consumer Research*, 39(3), 493–509. <https://doi.org/10.1086/663827>
- Koo, M., & Fishbach, A. (2014). Dynamics of self-regulation: How (un)accomplished goal actions affect motivation. *Motivation Science*, 1(S), 73–90. <https://doi.org/10.1037/2333-8113.1.S.73>
- Kreibich, A., Wolf, B. M., Bettschart, M., Ghassemi, M., Herrmann, M., & Brandstätter, V. (2022). How self-awareness is connected to less experience of action crises in personal goal pursuit. *Motivation and Emotion*, 46(6), 825–836. <https://doi.org/10.1007/s11031-022-09942-5>
- Landau, M. J., Greenberg, J., Solomon, S., Pyszczynski, T., & Martens, A. (2006). Windows into nothingness: Terror management, meaninglessness, and negative reactions to modern art. *Journal of Personality and Social Psychology*, 90(6), 879–892. <https://doi.org/10.1037/0022-3514.90.6.879>
- Landau, M. J., Johns, M., Greenberg, J., Pyszczynski, T., Martens, A., Goldenberg, J. L., & Solomon, S. (2004). A Function of Form: Terror Management and Structuring the Social

- World. *Journal of Personality and Social Psychology*, 87(2), 190–210.
<https://doi.org/10.1037/0022-3514.87.2.190>
- Landau, M. J., Kay, A. C., & Whitson, J. A. (2015). Compensatory control and the appeal of a structured world. *Psychological Bulletin*, 141(3), 694–722.
<https://doi.org/10.1037/a0038703>
- Lawrence, J. W., Carver, C. S., & Scheier, M. F. (2002). Velocity Toward Goal Attainment in Immediate Experience as a Determinant of Affect. *Journal of Applied Social Psychology*, 32(4), 788–802. <https://doi.org/10.1111/j.1559-1816.2002.tb00242.x>
- Leduc-Cummings, I., Werner, K. M., Milyavskaya, M., Dominick, J. K., & Cole, S. (2022). Experiencing obstacles during goal pursuit: The role of goal motivation and trait self-control. *Journal of Research in Personality*, 99, 104231.
<https://doi.org/10.1016/j.jrp.2022.104231>
- Lewin, K. (1951). Organization and pathology of thought: Selected sources. In D. Rapaport (Ed.), *Intention, will and need* (pp. 95–153). Columbia University Press.
- Lieberman, N., & Förster, J. (2008). Expectancy, Value and Psychological Distance: A New Look at Goal Gradients. *Social Cognition*, 26(5), 515–533.
<https://doi.org/10.1521/soco.2008.26.5.515>
- Marger, M. N. (2008). *Social inequality: Patterns and processes*. McGraw-Hill.
- Marlatt, G. A., & Kaplan, B. E. (1972). Self-initiated attempts to change behavior: A study of New Year's Resolutions. *Psychological Reports*, 30(123–131).
- Martin, J. J., & Gill, D. L. (1991). The Relationships Among Competitive Orientation, Sport-Confidence, Self-Efficacy, Anxiety, and Performance. *Journal of Sport and Exercise Psychology*, 13(2), 149–159. <https://doi.org/10.1123/jsep.13.2.149>
- Moore, P. S., Whaley, S. E., & Sigman, M. (2004). Interactions Between Mothers and Children: Impacts of Maternal and Child Anxiety. *Journal of Abnormal Psychology*, 113(3), 471–476.
- Mrazek, A. J., Ihm, E. D., Molden, D. C., Mrazek, M. D., Zedelius, C. M., & Schooler, J. W. (2018). Expanding minds: Growth mindsets of self-regulation and the influences on effort and perseverance. *Journal of Experimental Social Psychology*, 79, 164–180.
<https://doi.org/10.1016/j.jesp.2018.07.003>
- Newby-Clark, I. R., Ross, M., Buehler, R., Koehler, D. J., & Griffin, D. (2000). People focus on optimistic scenarios and disregard pessimistic scenarios while predicting task completion times. *Journal of Experimental Psychology: Applied*, 6(3), 171–182.
<https://doi.org/10.1037/1076-898X.6.3.171>

- Norcross, J. C., & Vangarelli, D. J. (1988). The resolution solution: Longitudinal examination of New Year's change attempts. *Journal of Substance Abuse, 1*(2), 127–134. [https://doi.org/10.1016/S0899-3289\(88\)80016-6](https://doi.org/10.1016/S0899-3289(88)80016-6)
- Nunes, J. C., & Drèze, X. (2006). The Endowed Progress Effect: How Artificial Advancement Increases Effort. *Journal of Consumer Research, 32*, 504–512.
- O'Keefe, P. A., Horberg, E. J., Lee, F., & Dweck, C. S. (2023). Implicit theories of opportunity: When opportunity fails to knock, keep waiting, or start cultivating? *Journal of Personality and Social Psychology, 124*(6), 1146–1173. <https://doi.org/10.1037/pspa0000330>
- Pennebaker, J. W., & Stone, L. D. (2004). Translating traumatic experiences into language: Implications for child abuse and long-term health. In L. J. Koenig, L. S. Doll, A. O'Leary, & W. Pequegnat (Eds.), *From child sexual abuse to adult sexual risk: Trauma, revictimization, and intervention*. (pp. 201–216). American Psychological Association. <https://doi.org/10.1037/10785-010>
- Raven, J. C. (1965). *Progressive matrices*. The Psychological Corporation.
- Rogers, T., Milkman, K. L., John, L. K., & Norton, M. I. (2015). Beyond good intentions: Prompting people to make plans improves follow-through on important tasks. *Behavioral Science & Policy, 1*(2), 33–41. <https://doi.org/10.1353/bsp.2015.0011>
- Rothman, R. A. (2005). *Inequality and stratification: Race, class and gender*. Prentice Hall.
- Rutjens, B. T., van Harreveld, F., & van der Pligt, J. (2010). Yes We Can: Belief in Progress as Compensatory Control. *Social Psychological and Personality Science, 1*(3), 246–252. <https://doi.org/10.1177/1948550610361782>
- Rutjens, B. T., van Harreveld, F., & van der Pligt, J. (2013). Step by Step: Finding Compensatory Order in Science. *Current Directions in Psychological Science, 22*(3), 250–255. <https://doi.org/10.1177/0963721412469810>
- Sankey, M. (2019, February 26). The Tortoise and the Hare of technology enhanced learning [LinkedIn]. <https://www.linkedin.com/pulse/tortoise-hare-technology-enhanced-learning-michael-sankey>
- Schroder, H. S., Yalch, M. M., Dawood, S., Callahan, C. P., Brent Donnellan, M., & Moser, J. S. (2017). Growth mindset of anxiety buffers the link between stressful life events and psychological distress and coping strategies. *Personality and Individual Differences, 110*, 23–26. <https://doi.org/10.1016/j.paid.2017.01.016>
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist, 26*.
- Schunk, D. H., & Pajares, F. (2005). Competence beliefs in academic functioning. In J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 85–104). Guilford Press.

- Shuper, P. A., Sorrentino, R. M., Otsubo, Y., Hodson, G., & Walker, A. M. (2004). A Theory of Uncertainty Orientation: Implications for the Study of Individual Differences Within and Across Cultures. *Journal of Cross-Cultural Psychology*, 35(4), 460–480. <https://doi.org/10.1177/0022022104266109>
- Siqueland, L., Kendall, P. C., & Steinberg, L. (1996). Anxiety in children: Perceived family environments and observed family interaction. *Journal of Clinical Child Psychology*, 25(2), 225–237.
- Slovinec D'Angelo, M. E., Pelletier, L. G., Reid, R. D., & Huta, V. (2014). The roles of self-efficacy and motivation in the prediction of short- and long-term adherence to exercise among patients with coronary heart disease. *Health Psychology*, 33(11), 1344–1353. <https://doi.org/10.1037/hea0000094>
- Sorrentino, R. M., Raynor, J. O., Zubeck, J. M., & Short, J. C. (1990). Personality functioning and change: Informational and affective influences on cognitive, moral, and social development. In R. M. Sorrentino & E. T. Higgins (Eds.), *The handbook of motivation and cognition: Foundations of social behaviour* (pp. 193–228). Guilford Press.
- Sorrentino, R. M., & Roney, C. J. R. (2000). *The uncertain mind: Individual differences in facing the unknown*. Psychology Press.
- Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. *Psychological Bulletin*, 124(2), 240–261. <https://doi.org/10.1037/0033-2909.124.2.240>
- Tariq, O. (2022, January 4). When Building A Business, Should You Be The Tortoise, The Hare—Or Both? *Forbes*. <https://www.forbes.com/sites/forbestechcouncil/2022/01/04/when-building-a-business-should-you-be-the-tortoise-the-hare---or-both/?sh=33966ac15344>
- Tenney, E. R., Meikle, N. L., Hunsaker, D., Moore, D. A., & Anderson, C. (2019). Is overconfidence a social liability? The effect of verbal versus nonverbal expressions of confidence. *Journal of Personality and Social Psychology*, 116(3), 396–415. <https://doi.org/10.1037/pspi0000150>
- Touré-Tillery, M., & Fishbach, A. (2012). The end justifies the means, but only in the middle. *Journal of Experimental Psychology: General*, 141(3), 570–583. <https://doi.org/10.1037/a0025928>
- Vallerand, R. J. (2000). Deci and Ryan's Self-Determination Theory: A View from the Hierarchical Model of Intrinsic and Extrinsic Motivation. *Psychological Inquiry*, 11(4), 312–318.
- Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2001). Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology*, 86(4), 605–620. <https://doi.org/10.1037/0021-9010.87.3.506>

- Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin*, 132(2), 249–268. <https://doi.org/10.1037/0033-2909.132.2.249>
- Whitson, J. A., & Galinsky, A. D. (2008). Lacking Control Increases Illusory Pattern Perception. *Science*, 322(5898), 115–117. <https://doi.org/10.1126/science.1159845>
- Wilt, J. A., Bleidorn, W., & Revelle, W. (2017). Velocity explains the links between personality states and affect. *Journal of Research in Personality*, 69, 86–95. <https://doi.org/10.1016/j.jrp.2016.06.008>
- Woolley, K., & Fishbach, A. (2022). Motivating Personal Growth by Seeking Discomfort. *Psychological Science*, 33(4), 510–523. <https://doi.org/10.1177/09567976211044685>
- Woolley, K., & Risen, J. L. (2018). Closing your eyes to follow your heart: Avoiding information to protect a strong intuitive preference. *Journal of Personality and Social Psychology*, 114(2), 230–245. <https://doi.org/10.1037/pspa0000100>
- Woolley, K., & Sharif, M. A. (2022). Down a Rabbit Hole: How Prior Media Consumption Shapes Subsequent Media Consumption. *Journal of Marketing Research*, 59(3), 453–471. <https://doi.org/10.1177/00222437211055403>
- Wrosch, C., & Miller, G. E. (2009). Depressive symptoms can be useful: Self-regulatory and emotional benefits of dysphoric mood in adolescence. *Journal of Personality and Social Psychology*, 96(6), 1181–1190. <https://doi.org/10.1037/a0015172>
- Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, 75(9), 1269–1284. <https://doi.org/10.1037/amp0000794>
- Yeager, D. S., Walton, G. M., Brady, S. T., Akcinar, E. N., Paunesku, D., Keane, L., Kamentz, D., Ritter, G., Duckworth, A. L., Urstein, R., Gomez, E. M., Markus, H. R., Cohen, G. L., & Dweck, C. S. (2016). Teaching a lay theory before college narrows achievement gaps at scale. *Proceedings of the National Academy of Sciences*, 113(24). <https://doi.org/10.1073/pnas.1524360113>
- Zhang, Y., & Huang, S.-C. (2010). How Endowed versus Earned Progress Affects Consumer Goal Commitment and Motivation. *Journal of Consumer Research*, 37(4), 641–654. <https://doi.org/10.1086/655417>
- Zlomke, K. R., & Young, J. N. (2009). A Retrospective Examination of the Role of Parental Anxious Rearing Behaviors in Contributing to Intolerance of Uncertainty. *Journal of Child and Family Studies*, 18(6), 670–679. <https://doi.org/10.1007/s10826-009-9269-7>

Biography

Jessica Paek received a Bachelor of Arts (*cum laude*) with Honors in Psychology and a concentration in Business Management from Columbia University in 2018. Her research focuses on motivation, goal pursuit, and prosocial behavior. She has published “Congratulations, so happy for you! Promotion motivation predicts social support for positive events” (Paek, Zee, Fitzsimons, & Higgins, 2022) in *Motivation Science*, “Tying the Value of Goals to Social Class” (*Wingrove, *Paek, Ponce de Leon, & Fitzsimons, 2023) in *Journal of Personality and Social Psychology*, and “The Andrew Carnegie Effect: Legacy motives increase the intergenerational allocation of wealth to collective causes” (Paek, Goya-Tocchetto, Wade-Benzoni, 2024) in *Social Psychological and Personality Science*. During her doctoral career, she received the Advanced Consortium on Cooperation, Conflict, and Complexity Scholarship (2021), the Best Theoretical / Empirical Paper Award from the Academy of Management’s Conflict Management Division (2021), the Kenan Institute for Ethics Graduate Fellowship (2021–2022), and the Lim Kim San Fellowship from Singapore Management University (2022). Upon graduation, she will be joining Indiana University’s Kelley School of Business as an Assistant Professor in the Department of Management and Entrepreneurship.