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Nudging persistence after failure through emergency reserves

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ABSTRACT

Along the path of struggling to reach their personal and organizational long-term goals, the experience of an initial subgoal failure can lead individuals to feel less committed to their overall goal and even to give up entirely on reaching it. In one field study and four lab studies, we examine the ability of a cost-free nudge to decrease the detrimental impact of subgoal failure on goal attainment. More specifically, we demonstrate that framing goals with emergency reserves, a type of slack, can motivate individuals to persist after subgoal failures, leading to better performance on long-term goals, compared to objectively equivalent goals without slack. After failing to reach a subgoal, we found that individuals with goals framed with emergency reserves felt a greater sense of perceived progress, causing them to feel more committed to their goal, and thus increasing their likelihood of persisting at their goals.

1. Introduction

Many of our most pressing societal challenges involve the failure of people to accomplish long-term goals, even when they are motivated to succeed. For instance, although many people want and try to lose weight (Serdula et al., 1999), up to 66% of people who succeed in losing weight gain most of it back (Mann et al., 2007), and two-thirds of adults in America are still considered overweight or obese (Flegal, Carroll, Kit, & Ogden, 2012). To accomplish long-term goals like losing weight, individuals often set short-term goals, such as going to the gym multiple days of the week. However, within a given day, people have several meetings, deadlines, tasks, and chores waiting for them. As a result, individuals often have to prioritize some tasks over others, leading to short-term goal failures. Unfortunately, these small short-term failures can derail people in reaching their larger goals. For example, missing a few days of a normal gym routine may lead to weeks without returning, consuming a splurge dessert may lead to an abandonment of a diet entirely, missing a soft deadline could lead to an even greater delay in eventually submitting a work project, or making a small error on a smaller training project might lead to resistance to work on a similar larger project. Further, consider the industrial laundry company described in Gubler, Larkin, and Pierce (2016) that tried to implement an attendance award system for reducing work tardiness. Even though the awards were largely symbolic, their implementation backfired and increased tardiness among previously high attendance workers once they missed a single day (the "post-fail" group). How can individuals be nudged to persist after these short-term failures?

Public policy interventions recently have begun integrating the research underlying why individuals struggle to reach their goals and make poor choices. These interventions have been shown to be very effective in nudging people to make healthier choices (Li & Chapman, 2013). For example, such interventions have been shown to increase influenza vaccinations by introducing prompts to form implementation intentions (Milkman, Beshears, Choi, Laibson, & Madrian, 2011) and manipulating the default (Chapman, Li, Colby, & Yoon, 2010), increase healthy eating through shifting social norms (Reicks, Redden, Mann, Mykerezi, & Vickers, 2012; Wisdom, Downs, & Loewenstein, 2010), and increase gym attendance by incentivizing people repeatedly for going to the gym (Charness & Gneezy, 2009; Ackland & Levy, 2015) and bundling gratifying "want" experiences with valuable "should" behaviors (Milkman, Minson, & Volpp, 2013).

This research examines the effectiveness of a cost-free choice architecture intervention that tackles a different obstacle that individuals face during long-term goal pursuit: persistence after goal failure. Throughout long-term goal pursuit, small short term failures are inevitable. Further, prior research has demonstrated the detrimental consequences of these small failures within goal pursuit (e.g., Heath, Larrick, & Wu, 1999; Polivy, 1976; Soman & Cheema, 2004; Cochran & Tesser, 1996). After failing to complete a subgoal (e.g., failing to go to the gym one day), individuals may feel less committed to their higher-order end goal (e.g., getting healthy) and give up on trying to pursue it

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(e.g., Fishbach, Dhar, & Zhang, 2006).

Since people are likely to encounter many small failures in pursuing their long-term goals, what determines whether individuals persist after these failures or not? Prior research has found a variety of factors that influence people's response to a goal failure; for example, self-esteem (Di Paula & Campbell, 2002; McFarlin, Baumeister, & Blascovich, 1984; Cruz Perez, 1973; Shrauger & Sorman, 1977), attribution of the failure to situational or personal reasons (Weiner, 1985,1986), the cognitive representation of the failure (Wilcox, Block, & Eisenstein, 2011), or salience of a superordinate goal (Fishbach et al., 2006) will all influence people's likelihood to persist after a failure. However, can the *framing* of the goal itself influence peoples' ability to persist after a failure?

This research demonstrates how and why the framing of objectively equivalent goals can nudge people to persist after a failure. In particular, in five studies, we demonstrate that people with goals framed with "emergency reserves" (e.g., a goal of going to the gym 7 days of the week with 2 emergency skip days) are more likely to persist after a failure than those with goals framed without emergency reserves (e.g., a goal of going to the gym 5 days of the week). More specifically, we suggest that framing goals with emergency reserves will decrease the detrimental impact of subgoal failure on goal attainment compared to goals without emergency reserves by providing a sense of continual, uninterrupted progress towards the overall goal, leading to increased commitment, increasing persistence after a subgoal failure.

2. Conceptual development

2.1. Consequences of subgoal and goal violation

Prior research has demonstrated that if people violate their goal, they may completely give up on pursuing it (Soman & Cheema, 2004; Cochran & Tesser, 1996, etc.). For example, Soman and Cheema (2004) demonstrate that violating a goal results in a deterioration of subsequent performance. Participants who missed a deadline (and thus violated their goal) took longer to eventually submit an assignment than individuals who set no goal to begin with. Similarly, research on the "what-the-hell" effect finds that when an individual fails to inhibit an unwanted behavior, they may completely abandon their goal. For example, if dieters believe that they have violated their diet, they become disinhibited in their subsequent eating behavior (Polivy, 1976; Spencer & Fremouw, 1979; Woody, Costanzo, Liefer, & Conger, 1981). Dieters ate more ice cream after a preload they were told was high in calories than after a preload they were told was low in calories although the preloads actually had the same amount of calories (Polivy, 1976). Relatedly, after receiving negative performance feedback compared to positive performance feedback, people have been shown to lower their subsequent goals (Ilies & Judge, 2005).

Many goals that we set naturally fall into a goal hierarchy, with higher-order end goals and lower-order subgoals. For example, a goal of getting fit by walking seven days of the week is an example of a higher-order end goal and the daily task of walking is an example of subgoal. Previous research has demonstrated the cognitive association between subgoals and endgoals (e.g., Fishbach, Shah, & Kruglanski, 2004; Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keppler, 2002; Shah & Kruglanski, 2002). Importantly, people have been shown to react similarly to a subgoal violation as they do to an endgoal violation. Similar to failing an endgoal, if people fail to complete one subgoal (e.g., exercise), they are less likely to try to complete a related subgoal (e.g., eating healthy) when they are primed of their superordinate goal (e.g., to become more fit) (Fishbach et al., 2006)[1]. Other research has found that task-related failure (repeated trials of the same task) leads to worse performance in subsequent tasks (e.g., Ilies & Judge, 2005; Shah & Kruglanski, 2002). Further, Devezer, Sprott, Spangenberg, and Czellar (2014) demonstrated that consumers are less committed to their end-goal if they fail to reach a subgoal. When it comes to goal persistence, it is clear that small failures can quickly derail overall progress.

2.2. Factors affecting the consequence of goal failure on goal persistence

Prior literature has found a few factors that affect how people respond to failure. Failing at a task can lead some people to give up or lower their subsequent related goals while for others they may persist or even increase their subsequent related goals. For example, strength of perceived efficacy (Bandura & Cervone, 1983; Bandura & Locke, 2003; Bandura, 1991), goal commitment (Bandura, 1991; Fishbach et al., 2006), and self-esteem (Di Paula & Campbell, 2002; McFarlin et al., 1984; Cruz Perez, 1973; Shrauger & Sorman, 1977) have all been shown to affect people's reaction to failure. Further, previous research has found that individuals who attribute failure to uncontrollable or stable causes are more likely to withdraw from the task, adopt helpless responses to failure, exhibit lower levels of self-efficacy, and lower their performance goals (Donovan & Williams, 1996; Henderson & Dweck, 1990; Mikulincer & Nizan, 1988; Mikulincer, 1989; Thomas & Mathieu, 1994; Weiner, 1986; Williams, Donovan, & Dodge, 2000).

Importantly, people's cognitive representation of the failure (rather than the failure itself) can affect the likelihood of someone completely abandoning a goal (Wilcox et al., 2011). For example, individuals with high self-control spent more when they had outstanding credit card debt, perceiving the debt as a representation of failure and thus experiencing the what-the-hell effect. However, when the available credit on the credit card was increased, then this effect was eliminated (Wilcox et al., 2011). The increase in available credit was shown to reduce the perceived sense of failure and inhibit the "what-the-hell" effect. We suggest that framing goals with emergency reserves will reduce the impact of goal failure on goal attainment, by transforming a sense of subgoal failure into a feeling of subgoal success.

2.3. Goal progress

While subgoal failure can derail people from reaching their goal, subgoal success and goal progress can motivate people to persist at their goals. If people perceive that they have made progress towards their goal through a subgoal completion and interpret this as goal commitment (e.g., Bem, 1972; Festinger, 1957), they are likely to be more motivated to take similar complementary actions (Shah, Friedman, & Kruglanski, 2002; Fishbach & Dhar, 2005; Fishbach et al., 2006).

Supporting this notion, both animals and humans have been found to increase goal persistence when they feel that they have made more progress on their goal (e.g., Kivetz, Urminsky, & Zheng, 2006). Gal and McShane (2012) found that completing more discrete subgoals leads people to be more likely to complete their overall goal. The sense of progress from achieving subtasks toward a goal produces feelings of well-being and high-morale (Brunstein, 1993; Cantor & Kihlstrom, 1987). As a result, Soman and Shi (2003) found that people prefer goal paths in which they are making continuous progress towards their goal rather than paths in which there is an interruption in their progress.

2.4. Goal setting & goal framing

Prior research has found numerous factors that affect people's goal performance, such as the specificity of the goal or the difficulty of the goal (Locke & Latham, 1990). In addition to setting absolutely different goals, the framing of the same goal can also influence people's performance, such as positive (gain) or negative (loss) framing (e.g., Krishnamurthy, Carter, & Blair, 2001). Further research has demonstrated that people respond differently to progress towards their goal,

[1] Consumers have also been shown to be more likely to persist after a subgoal failure when they are not primed with their superordinate goal (Fishbach & Dhar, 2006; Festinger, 2005). However, for all of our studies, consumers are always working towards a bigger, superordinate goal.

depending on how the incentive is framed (Schmidt & DeShon, 2007).

However, less research has explored how the framing of a goal can impact people's persistence in the face of an explicit failure. Some research has explored how framing a goal as a prevention-focused goal (e.g., avoiding losing points) vs a promotion-focused goal (e.g., try to gain points) leads people to respond to negative vs. positive feedback differently (Förster, Grant, Idson, & Higgins, 2001).

In this paper, we investigate a different type of goal framing. We demonstrate that framing goals with an emergency reserve can increase goal persistence after failures. Emergency reserves are slack around a goal that can be used if needed but at a small psychological cost (Sharif & Shu, 2017). For example, a reserve can be 20 extra emergency dollars in a budget, 200 extra emergency calories available in a diet for the week, 2 emergency late arrival excuses from work, 1 emergency week of lower billable hours out of an annual overall total, or an emergency skipping day for exercise.

More specifically, in this paper, we will be comparing how likely people are to persist after a failure with goals framed with emergency reserves versus goals framed without emergency reserves. In particular, we will compare goals with emergency reserves to two other types of goals. Goals with emergency reserves are framed with a difficult reference point plus an additional emergency reserve (e.g., a goal of reaching your step goal 7 days of the week + 2 "emergency skip" days). At face value, this is the equivalent to an Easy goal framed with an easier reference point exactly equal to having the additional emergency reserve already incorporated with no additional cost (e.g., reaching your step goal 5 days of the week). To allow for possible anchoring effects, we also compare Reserve goals to Hard goals, which are framed with the same upper end reference point but without the additional emergency reserve (e.g., reaching your step goal 7 days of the week). Reserve goals and Hard goals may be perceptually equivalent in that they have the same upper-bound reference point, while Easy goals and Reserve goals are technically equivalent in that they both have the same lower-bound reference point. In this sense, the reserve framing acts as a nudge since there are no limitations or constraints on behavior, and the framing is easy to ignore if the individual prefers to focus only on the upper or lower bound reference points (Thaler & Sunstein, 2008). We compare the impact of failure on persistence to people with both of these goals, as one can argue that the Reserve goal shares properties with both.

Building off of the literature on goal violation and goal progress, we hypothesize that framing goals with emergency reserves will increase the likelihood of persisting after a failure compared to framing goals without emergency reserve. More specifically, we suggest that the emergency reserve may decrease the sense of failure by providing a sense of continual, uninterrupted progress towards the overall goal, leading to increased persistence after a subgoal failure.

Prior work has focused on investigating how consumers with emergency reserves may be motivated to reach a difficult reference point of their goal (and thus resist using their emergency reserves) **before** experiencing a subgoal failure (Sharif & Shu, 2017). For example, emergency reserves can increase the likelihood of exercising a sixth or seventh day after having already exercised five days. As a result, they did not explore how subgoal failure affects overall goal pursuit, nor the consequences of consumers actually applying their emergency reserve after a failure. This paper builds on those prior findings both by investigating how reserves specifically help after cases of failure, and by testing this framing intervention in a field experiment with consequential behavior.

In Study 1, we present a field study to test the impact of framing goals with emergency reserves in a real-life exercise setting, demonstrating that individuals with goals framed with emergency reserves persist more after a subgoal failure than individuals with goals framed without emergency reserves. In Studies 2 and 3, we demonstrate that people who have goals framed with emergency reserves are more likely to persist after a forced failure than those with goals framed without emergency reserves. Further, we provide mediation evidence that participants feel like they have made more progress to their goal when they have an emergency reserve available during a failure, leading them to feel more committed to their goal, and thus more likely to persist. Lastly, in Study 4a and 4b, we demonstrate that the timing of applying the emergency reserve is an important component of the process.

3. Study 1: Tracking steps field study

Study 1 aimed to test the effectiveness of framing goals with emergency reserves in a real-world setting, in which participants were assigned a weekly goal (the higher order end goal) of reaching a certain number of daily step goals (the subgoal) during each week. In this field study, we specifically wanted to examine if individuals with goals framed with emergency reserves were more likely to persist after a subgoal failure (i.e., failing to reach their step goal on any given day).

3.1. Procedure

315 students and staff (M_{age} = 22.34; Age Range: 18–50; 73 males) from a large university in the Southwest initially signed up to participate in this five-week long study. Participants were asked to track their steps for five weeks on a pedometer application on their smart phones. Every night they recorded their steps on a Google spreadsheet shared with us; steps were confirmed via app screenshots. In the first week of the study, participants were asked to walk and exercise as they normally would. This baseline week allowed us to form an individual daily step goal for each participant, formulated to be 120% of his or her average steps from the baseline week.

The 273 participants who completed the baseline week were then randomly assigned to receive one of four weekly goal conditions (Hard, Easy, Reserve-Monthly, or Reserve-Weekly[2]). Participants' goals were to complete their step goal five days per week in the Easy condition and seven days per week in the Hard, Reserve-Weekly, and Reserve-Monthly conditions. However, participants in the Reserve-Weekly condition had two optional emergency skips each week that they could apply if they failed to reach their step goal. If they did not use them in a given week, these two weekly emergency skips did not roll over to the next week. In contrast, participants in the Reserve-Monthly condition had eight optional emergency skips available across the entire four weeks that they could apply if they failed to reach their step goal. Thus, participants in the Reserve-Monthly condition had the same number of skips as the Reserve-Weekly participants, but the participants in the Reserve-Monthly condition had more flexibility in when they could apply their emergency reserves; they could apply more than 2 emergency skips in a given week whereas those in the Reserve-Weekly condition could not. As both goals have emergency reserves, we expected that they would work similarly in terms of increasing persistence after failure.

After completing the baseline week, participants' Google spreadsheets were updated with their Daily Step Goal, the number of days that constituted their Weekly goal (determined by the Hard, Easy, Reserve-Weekly, or Reserve-Monthly conditions), a Reserve tracker (for those in the Reserve conditions), and a graphical representation of their progress. If participants successfully reached their step goal on a given day, a blue bar would show on the graph representing their progress. If they did not reach their goal, nothing (no bar) would show on that day. If participants chose to apply the emergency skip on a given day, they would click on a red "Apply Emergency Skip" button and a blue bar would show for that day (see Fig. 1). Thus, using the emergency reserves made participants feel a sense of goal progress even when they failed to reach their step goal, similar to the goal progress they observed when they met the daily goal.

[2] There were no significant differences in step goals between conditions.

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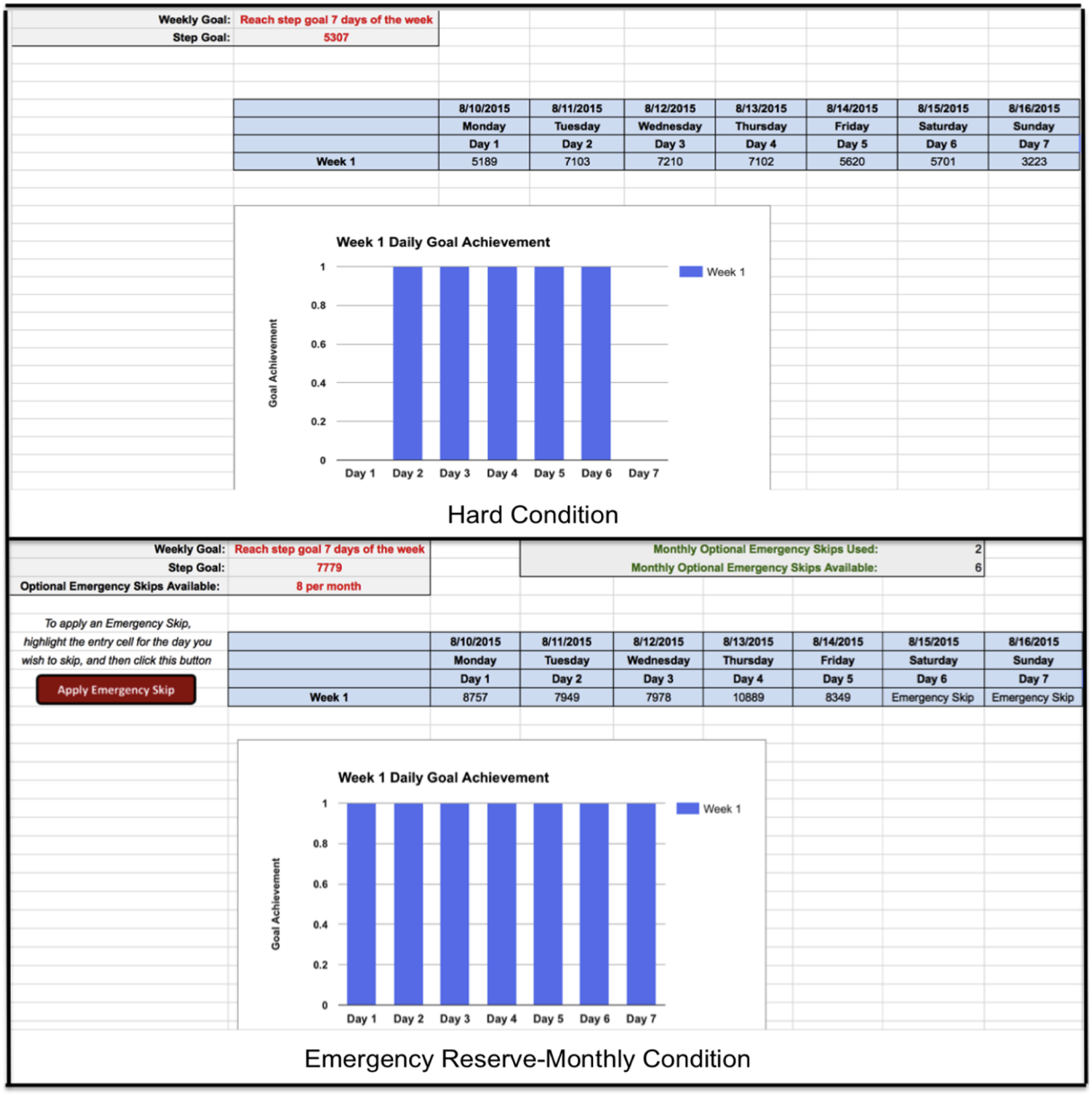

Fig. 1. *Two Screenshots of the Google Spreadsheets for two participants (one in the Hard* Condition and one in the Reserve-Monthly condition) who reach their step goal 5 days of the week.

After being assigned their weekly goal, participants continued to track their steps every night for four weeks. After four weeks, participants completed a final questionnaire, which included various individual difference measures, such as measures of propensity to plan (Lynch, Netemeyer, Spiller, & Zammit, 2010), self-control (Tangney, Baumeister, & Boone, 2004), personality (Gosling, Rentfrow, & Swann, 2003), and maximizing/satisficing behavior (Turner, Rim, Betz, & Nygren, 2012). Twenty-eight participants resigned or were eliminated from the study for failing to track their steps daily on the Google spreadsheet (for more details about the method please see the Web Appendix).

3.2. Results

Analysis #1: Overall motivation to take steps. Our main interest in this analysis was to assess the motivation of participants with goals with emergency reserves vs. those with goals without emergency reserves. As it is possible that people may perform differently with a Reserve-Monthly goal vs. a Reserve-Weekly goal, we performed two linear regressions: one regression included three dummy variables representing the Hard, Easy, and Reserve-Monthly condition with the Reserve-Weekly condition as the reference group and another set of regressions included three dummy variables representing the Hard, Easy, and Reserve-Weekly condition with the Reserve-Month condition as the reference group. The Betas below represent the coefficients from these regressions; these Betas are from regressions that do not control for any covariates. By using the Reserve conditions as the reference groups in independent regressions, we are able to examine whether each Reserve condition differs significantly from both the Hard and Easy condition.

We first examined the average number of days that participants reached their step goal; across the four weeks of the study, individuals in the Reserve-Weekly and Reserve-Monthly condition reached their step goals up to forty percent more days on average per week than those in the Hard and Easy conditions: 3.11_{Easy} vs. $4.00_{\text{Reserve-Weekly}}$, $\beta = -0.90$, $p = .005$; 2.83_{Hard} vs. $4.00_{\text{Reserve-Weekly}}$, $\beta = -1.18$,

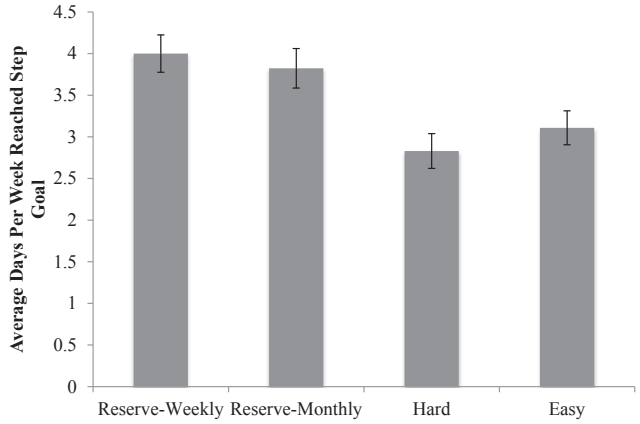

Fig. 2. Average days per week reached step goal separated by condition.

$p < .001$; 3.11_{Easy} vs. $3.82_{Reserve\text{-}Monthly}$, $\beta = -0.72$, $p = .023$; 2.83_{Hard} vs. $3.82_{Reserve\text{-}Monthly}$, $\beta = -0.977$, $p = .001$ (see Table 1 for complete regression results with and without covariates; see Fig. 2).

We next examined the average number of steps participants took, controlling for their step goal. Individuals in both Reserve conditions were more likely to take more steps on average per day than those in the Easy and Hard conditions, 6661.81_{Easy} vs. $7753.87_{Reserve\text{-}Weekly}$, $\beta = -874.05$, $p = .018$; 6678.31_{Hard} vs. $7753.87_{Reserve\text{-}Weekly}$, $\beta = -1053.74$, $p = .004$; 6661.81_{Easy}vs. $7981.27_{Reserve\text{-}Monthly}$, $\beta = -639.21$, $p = .084$; 6678.31_{Hard} vs. $7981.27_{Reserve\text{-}Monthly}$, $\beta = -818.90$, $p = .024$ (see Table 2 for complete regression results with and without covariates). Therefore, participants with emergency reserves, regardless of whether they can use their reserves weekly or monthly, perform better than those without emergency reserves.

3.3. Persistence after failure

In the next set of analyses, we examine how participants with goals with emergency reserves (vs. those without emergency reserves) respond to subgoal failure. We will present a series of analyses and robustness checks that all arrive at the same conclusion: participants with emergency reserves persist more after a subgoal failure than those without emergency reserves.

Analysis #2: Examining subgoal failure on any given day. We examined our data to see if there was evidence to support our primary hypothesis that individuals with Reserve goals were more likely to persist after failing to reach their step goal (i.e. the subgoal). We expected that people with goals framed with emergency reserves would be more likely to persist after failing their step goal on any given day than those with Hard goals and Easy goals, as the emergency reserve would reduce the perception of subgoal failure.

As participants were recruited for the purpose of becoming more fit, all participants have a larger superordinate goal of becoming more fit; as a result, if individuals fail to reach their goal or subgoal, there is still a larger health benefit of trying to reach their subgoal the remaining days. Further, consistent with the definition of a nudge, there is no monetary incentive for people to reach their goals, nor there is a punishment for failing to reach their goal. Thus, the behavior observed is being driven purely by the goals themselves.

We predicted that individuals with goals with emergency reserves would be especially more likely to persist than those with a Hard goal after failing to reach their step goal one day. If participants fail to reach their step goal just one day in the Hard goal condition, they have not only failed to reach a subgoal, but they have violated their higher-order end goal (i.e., reach their step goal seven days of the week). However, participants in the Reserve conditions, so long as they have emergency skips available, have not failed to reach their higher-order end goal.

Similar to individuals in the Reserve conditions, if participants in the Easy condition fail to reach up to two daily subgoals or less, they have not failed at their end goal (i.e., reach their step goal 5 days of the week). Even so, we expected that those with goals with emergency reserves would still persist more after failing a subgoal and applying their emergency reserve than those with Easy goals since the emergency reserve alleviates the sense of failure from the subgoal violation.

For each individual, we created a single measure based on the proportion of times they succeeded at reaching their step goal on any given day after failing to reach their step goal the previous day. For example, if a given individual fails to reach their step goal 10 times, and on 5 of the subsequent days they succeed at reaching their step goal but the other 5 subsequent days they fail and do not reach their step goal, they would receive a score of 0.5. This score was our dependent variable. We chose to examine only the initial subsequent day in this analysis because we wanted to examine the **immediate** consequence of someone failing to reach their step goal. We expected that this immediate sense of failure would lead those with goals without emergency reserves to feel demotivated the next day; however, we expected that those with emergency reserves would feel less demotivated and thus more likely to reach their step goal the next day.

We found that participants with Reserve-Week goals were significantly more likely to reach their step goal the day subsequent to failing to reach their step goal than those with Hard or Easy goals; participants with Reserve-Month goals were significantly more likely to persist after a failure than those with Hard goals and directionally more than those with Easy goals; 0.37_{Hard} vs. $0.55_{Reserve\text{-}Weekly}$, $\beta = -0.18$, $p < .001$; 0.37_{Hard} vs. $0.48_{Reserve\text{-}Monthly}$, $\beta = -0.10$, $p = .03$; 0.44_{Easy} vs. $0.55_{Reserve\text{-}Weekly}$, $\beta = -0.11$, $p = .02$; 0.44_{Easy} vs. $0.48_{Reserve\text{-}Monthly}$, $\beta = -0.04$, $p =$ n.s. (see Table 3 for complete regression results with and without covariates).

Further, demonstrating the impact of applying emergency reserves, participants with both Reserve-Weekly and Reserve-Monthly goals, who failed to reach their step goal **and** applied their emergency reserve, were more likely to persist after a subgoal failure than those with Hard goals ($ps < .01$) and Easy goals ($ps < .08$). However, if they did not/could not apply their emergency reserve after a subgoal failure, they persisted about the same amount as those with Hard and Easy goals, suggesting that actual use of the reserve is important to post-failure persistence.

Analysis #3: Examining persistence after the first subgoal failure each week. The previous analysis assessed how likely individuals were to succeed at their step goal on a day subsequent to failure without any restrictions on when participants failed to reach their subgoal. However, this analysis does not fully disentangle if the beneficial effect of the Reserve-Weekly and Reserve-Monthly goals are due to (1) higher overall motivation (i.e., benefits **before** subgoal failure), (2) the reserve's ability to reduce the sense of failure and thus increase the likelihood of persisting **after** subgoal failure, or (3) a combination of both. For example, imagine a person in the Easy condition succeeds with their step goal on days 1–5 and have thus reached their 5-day end-goal, but then fails to reach their step goal on days 6 and 7. This decreased persistence (on day 7) after a subgoal failure on day 6 could be due to the mechanism proposed in Sharif and Shu (2017): a lower motivation to reach the difficult reference point, rather than due to the reserve's ability to reduce the sense of failure after a subgoal violation.

To further assess how subgoal failure, in particular, impacts participants in the Reserve conditions vs. the Easy condition, we analyzed how likely participants were to persist after failing to reach their step goal **for the first time** on days 1 through 5 each week. In this case, participants in the Reserve-conditions and the Easy conditions have neither reached nor failed their overall goal (i.e., reach their step goal five days of the week). This analysis thus specifically looks at how subgoal failure impacts participants' likelihood of persisting after a failure independent of overall goal completion status, and is a more narrow and conservative test than the post-failure analysis above.

For example, if a given individual (1) experiences their first step goal failure on Day 3 of Week1 but succeeds at reaching their step goal the next day (Day 4), (2) fails for the first time of Week 2 to reach their step goal on Day 2 and also fails to reach their step goal the next day (Day 3), (3) fails for the first time of Week 3 to reach their step goal on Day 4 but succeeds at reaching their step goal the next day (Day 5), and (4) fails for the first time of Week 4 to reach their step goal on Day 1 but again succeeds at reaching their step goal the next day (Day 2), they would receive a score of 0.75 since they succeeded 3 out of 4 times at reaching their step goal after failing. This score (a single aggregate measure per individual, ranging from 0 to 1) was used as our dependent variable in the following analyses.

We found that participants in both the Reserve-Weekly and Reserve-Monthly conditions were more likely to persist than those in the Easy and Hard conditions (0.42_{Easy} vs. $0.54_{\text{Reserve-Monthly}}$, $\beta = -0.12$, $p = .048$; 0.42_{Easy} vs. $0.60_{\text{Reserve-Weekly}}$, $\beta = -0.18$, $p = .004$; 38_{Hard} vs. $0.54_{\text{Reserve-Monthly}}$, $\beta = -0.16$, $p = .01$, 38_{Hard} vs. $0.60_{\text{Reserve-Weekly}}$; $\beta = -0.21$, $p = .001$) (see Table 4 for complete regression results with and without covariates). Thus, even while narrowing our analysis to focus on the first failure during days 1 through 5 each week, emergency reserves still appear to provide a benefit **after** a subgoal failure.

Analysis #4: Comparing persistence after subgoal failure vs. subgoal success. For a further robustness check of how reserves may be affecting persistence after subgoal failure, it may be valuable to compare how individuals persist differentially after a subgoal failure vs a subgoal success. In making this comparison, this next analysis helps us understand how people psychologically perceive the act of using their emergency reserve.

For this analysis, we conducted a linear regression for **each individual** predicting their likelihood of succeeding at reaching their daily step goal on each day (1 = succeed; 0 = fail) based on (1) a dummy variable representing whether they have to complete that day to reach their overall weekly goal (1 = need to complete; 0 = do not need to complete), and (2) a dummy variable representing whether they succeeded at reaching their step goal the previous day (1 = succeeded previous day; 0 = failed previous day). The two resulting coefficients (necessity of completing, previous success or failure) from these per-individual likelihood regressions then served as our dependent variables in the following analyses. For each of the individual-level measures, we conducted two linear regressions: one with the Reserve-Monthly condition as the reference group and the other with the Reserve-Weekly conditions as the reference group.

We found that individuals in both the Reserve-Weekly and Reserve-Monthly condition were significantly more likely to persist if the day was required for the goal than those in the Hard condition, but not than those in the Easy condition (0.06_{Hard} vs. $0.30_{\text{Reserve-Monthly}}$, $\beta = -0.25$, $p = .003$; 0.06_{Hard} vs. $0.35_{\text{Reserve-Weekly}}$, $\beta = -0.29$, $p = .002$). This may suggest that participants with a Hard goal give up earlier, even before they have failed, than those with the Reserve-Weekly and Reserve-Monthly goal. Participants with Hard goals may find the goal too difficult, or seemingly impossible, and give up even when the goal is still within their reach.

Lastly, supporting our hypothesis, we found that participants in the Hard condition were significantly less likely to persist after a sub-goal failure, relative to a sub-goal success, than those in the Reserve-Weekly condition and the Reserve-Monthly condition (0.44_{Hard} vs. $0.56_{\text{Reserve-Weekly}}$; $\beta = -0.12$, $p = .022$; 0.44_{Hard} vs. $0.58_{\text{Reserve-Monthly}}$, $\beta = -0.12$, $p = .025$) and participants in the Easy condition were significantly less likely to persist after a sub-goal failure, relative to a sub-goal success, than those in the Reserve-Monthly condition and marginally significantly less likely than those in the Reserve-Weekly condition (0.46_{Easy} vs. $0.56_{\text{Reserve-Weekly}}$; $\beta = -0.10$, $p = .056$; 0.46_{Easy} vs. $0.58_{\text{Reserve-Monthly}}$, $\beta = -0.14$, $p = .009$) (see Table 5 for complete regression results with and without covariates.)

3.4. Discussion

Study 1 demonstrates that individuals with goals framed with emergency reserves are more likely to persist after a subgoal violation than those with goals framed without emergency reserves. This study successfully expands prior work on emergency reserves into a longer field experiment with more personally consequential outcomes than what has been previously tested in the lab. It also allows more explicit testing of how subgoal failures (here generated due to natural variation in people's ability to complete their daily goals) can affect overall persistence with and without emergency reserves. Given that some individuals may have not followed or internalized the external mere goals we set, we expect that our effects may be a conservative test of our hypotheses.

In the next study, rather than assessing natural variation in subgoal success and failure, we directly manipulate subgoal success and failure and examine how this affects participants' persistence for goals framed with and without emergency reserves.

4. Study 2: Word search success vs. failure study

The participants in our field experiment reported causes for failure that were both within their control (too tired) and outside of their control (sick, work deadlines). Both types of failures are also possible within many organizational contexts, but failures due to outside constraints are often more likely, such as failure due to lack of resources or overconfident management projections. In this study, we move our intervention testing into a lab environment to test how external manipulation of task failure affects persistence with and without emergency reserves.

1206 participants (M_{age} = 33.97; Age Range: 18–75; 537 males) completed this survey on Amazon Mechanical Turk. Participants were told that they would be completing a series of 5 word search games and that their performance on these games is an indication of their visual detection skills. They were also told that the more word search games that they complete, the better their visual detection skills are. If participants believe that their visual detection skills improve by completing more word search games, then there is a benefit for each game they try (sub-goal), even if they fail their overall goal. Participants were assigned to one cell in this 2 (Succeed vs. Fail) × 3 (Easy, Hard, Reserve) design.

Participants in the Easy condition were told that their goal was to score 4 points; participants were told in the Hard condition that their goal was to score 5 points. Participants in the Emergency Reserve condition were told that their goal was to score 5 points. They were also told, "You also have 1 optional 'emergency' point. This emergency point is available just in case you need it to help you reach your goal. If you fail to complete one word search, you can use this 'emergency' point and receive a point for that failed word search." Note that goals were purely symbolic, as there was no pay difference for accomplishing them, and performance on them was meant to be indicative of a larger goal of having strong visual detection skills. Prior research has demonstrated that failure to reach mere subgoals does affect individual's behavior (e.g., Fishbach et al., 2006).

After completing one practice game, participants began the games. The first game was very easy in which they had to find 4 words in 3 minutes, leading everyone to succeed. For the second game, participants were randomly assigned to the Succeed or Fail condition. In the Succeed condition, participants were asked to find 2 words in 2 ½ minutes, leading most participants to be able to beat that game. In the Fail condition, participants were asked to find 4 words in 3 minutes, leading most participants to fail to be able to beat that game. For those in the Fail condition, after failing the second word search, participants in the Reserve condition were asked if they want to apply their emergency reserve.

Afterwards, participants were informed that there are 3 games left

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and that they would have unlimited time to find all the words. They were told that while they have unlimited time for these games, they are still challenging to beat and that each game takes on average 5–8 min to complete. They were asked if they want to try the 3rd game in which they will be asked to find 7 words. They were informed that if they choose to try the 3rd game, they would be asked afterwards if they want to try the 4th game. If they then chose to try the 4th game, they would also be asked if they want to try the 5th game. In the 4th game, they had unlimited time to find 10 words. In the 5th game, they had unlimited time to find 7 words.

4.1. Results

We conducted two linear regressions, predicting two different dependent variables of interest: (1) number of word searches participants tried after the manipulation, and (2) number of word searches participants beat after the manipulation. Independent variables in the regression were two dummy variables representing the Hard condition and the Easy condition, with the Reserve condition as the reference group. We analyze the data of all 1206 participants who completed the study in the following analyses.

Analysis #1: Overall Effect. Overall, we found that participants in the Reserve

condition tried significantly more word searches than those in the Easy and Hard condition (1.83_{Easy} vs. 2.03_{Reserve}; $\beta = -0.20$, $p = .028$; 1.77_{Hard} vs. 2.03_{Reserve}; $\beta = -0.26$, $p = .004$[3]) and also beat significantly more word searches than in the Easy and Hard condition (1.51_{Easy} vs. 1.76_{Reserve}; $\beta = -0.25$, $p = .007$; 1.48_{Hard} vs. 1.76_{Reserve}; $\beta = -0.28$, $p = .002$). Thus, on average, participants with goals with emergency reserves persist more than those with goals without emergency reserves.

Analysis #2: How Does Subgoal Failure vs. Success Affect Overall Persistence Behavior? We next examined how our manipulation (succeeding or failing at the second word search) interacted with participants' assigned goal to influence their persistence behavior.

We thus conducted two linear regressions, predicting (1) total number of word searches tried and (2) total number of word searches completed, with a dummy variable representing the Hard condition, a dummy variable representing the Easy condition, a dummy variable for the failure vs. success manipulation (1 = Fail condition; 0 = Succeed condition), and two variables representing their interactions.

We found a significant 2 (Reserve vs Hard) × 2 (Succeed vs Fail) interaction predicting the total number of word searches tried, $\beta = -0.51$, $p = .004$, and beat, $\beta = -0.38$, $p = .039$. Simple effects analysis revealed that in the Reserve condition failing or beating the 2nd word search did not significantly influence the number of word searches that they tried afterwards (# Tried Analysis: $2.02_{\text{Reserve-Fail}}$ vs. $2.04_{\text{Reserve-Succeed}}$; $\beta = -0.018$, $p = .88$; # Beat Analysis: $1.76_{\text{Reserve-Fail}}$ vs. $1.75_{\text{Reserve-Succeed}}$; $\beta = 0.007$, $p = .96$). However, in the Hard condition, participants in the Fail condition tried significantly fewer word searches than those in the Succeed condition (# Tried Analysis: $1.50_{\text{Hard-Fail}}$ vs. $2.03_{\text{Hard-Succeed}}$; $\beta = -0.53$, $p < .001$; # Beat Analysis: $1.29_{\text{Hard-Fail}}$ vs. $1.66_{\text{Hard-Succeed}}$; $\beta = -0.37$, $p = .004$). We did not find a significant 2 (Reserve vs Easy) × 2 (Succeed vs Fail) interaction, (#Tried Analysis: $\beta = -0.067$, $p = .71$; #Beat Analysis, $\beta = -0.12$, $p = .51$).

Thus, as seen in Fig. 4, unlike participants with Hard goals, participants with goals with emergency reserves act almost identically after failing to reach their subgoal and applying their emergency reserve as they do when they succeed at reaching their subgoal. This suggests that emergency reserves are able to transform a sense of failure into a sense of progress, leading to maintained persistence both after a success and after a failure.

Further, we found that participants with goals with emergency reserves also are more likely to persist **after a subgoal failure overall** compared to both Easy goals and Hard goals. Simple effect analysis revealed that after failing the second word search, participants with an Easy goal beat significantly fewer word searches ($1.45_{\text{Easy-Fail}}$ vs. $1.76_{\text{Reserve-Fail}}$; $\beta = -0.31$, $p = .019$), and tried marginally significantly fewer word searches ($1.79_{\text{Easy-Fail}}$ vs. $2.02_{\text{Reserve-Fail}}$; $\beta = -0.24$, $p = .070$), than those with a Reserve goal. Participants with Hard goals also beat significantly fewer word searches ($1.45_{\text{Hard-Fail}}$ vs. $1.76_{\text{Reserve-Fail}}$; $\beta = -0.47$, $p < .001$), and tried significantly fewer word searches ($1.79_{\text{Hard-Fail}}$ vs. $2.02_{\text{Reserve-Fail}}$; $\beta = -0.52$, $p < .001$), than those with a Reserve goal after failing the second word search (see Fig. 3).

4.2. Discussion

We found overall that participants persist more with goals framed with emergency reserves than goals without. More importantly, we demonstrate that failing a sub-goal has no significant influence on the persistence behavior of consumers whose goals have emergency reserves, leading them to expend equal effort after a failure as after a success. Consumers with goals with emergency reserves persist the same after failing a subgoal and applying their emergency reserve as they do when they succeed at a sub-goal. Therefore, the emergency reserve appears to be able to transform the sub-goal failure into a feeling of sub-goal success. Further, we demonstrate that overall participants with goals with emergency reserves are significantly more likely to persist after a sub-goal failure than those with both Easy goals and Hard goals.

In Studies 1 and 2, applying an emergency reserve was graphically displayed as being equivalent to reaching a subgoal (see Fig. 1). In Study 3, we change the graphic displayed to participants after applying their emergency reserve to make it visually different than succeeding at reaching a subgoal to assess if the emergency reserve still has a beneficial impact if the graphic is distinct.

A second aim of Study 3 was to further understand the mechanism behind the effect. We suggest that after a subgoal failure, applying the emergency reserve reduces the sense of a loss of progress towards individuals' goals, leading them to feel more committed, and be more likely to persist. Soman and Shi (2003) found that people prefer goal paths in which they are making continuous progress towards their goal rather than paths in which there is an interruption in their progress. Similarly, we suggest that the emergency reserve allows people to feel like they are continuing to make progress towards their goals, rather than experiencing an interruption in their progress, leading them to feel more committed to their goal and more likely to persist. In this study, we tested whether there is mediation evidence to show that participants with goals with emergency reserves feel like they have made more progress on their goal after a failure, which leads them to feel more committed to their goal, and thus be more likely to persist.

5. Study 3: Word search failure: graphic of reserve

5.1. Procedure

903 participants ($M_{\text{age}} = 36.16$; Age Range: 19–79; 466 males) completed this survey from Amazon Mechanical Turk. Participants were told that they would be working on improving their visual detection skills and spelling skills. In order to improve these skills, they would be asked to find the typos in a series of passages. They were told that the more passages that they try to find the errors, the more likely it is they would improve their visual detection skills. There were three passages total that they would be asked to find the errors. A graphic displayed participants' progress after each passage. A circle was filled in black if they were able to successfully complete the passage and find all

[3] Try all 3 word searches: $58.8\%_{\text{Reserve}}$, $50.6\%_{\text{Hard}}$, $41.9\%_{\text{Easy}}$; Try 2 word searches: $8.1\%_{\text{Reserve}}$, $5.1\%_{\text{Hard}}$, $21.3\%_{\text{Easy}}$; Try 1 word search: $10.4\%_{\text{Reserve}}$, $15.2\%_{\text{Hard}}$, $11.9\%_{\text{Easy}}$; Try 0 word searches: $22.7\%_{\text{Reserve}}$, $29.1\%_{\text{Hard}}$, $21.8\%_{\text{Easy}}$.

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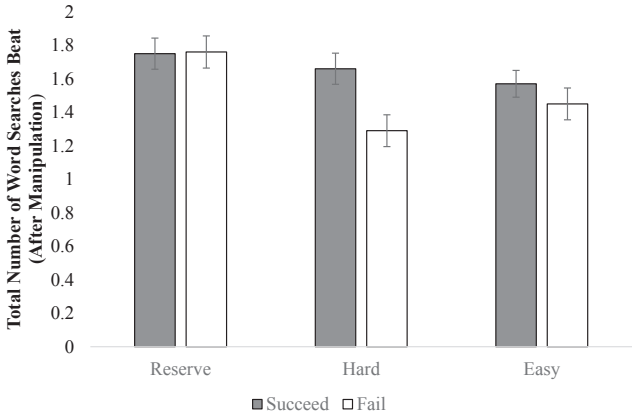

Fig. 3. Total number of word searches beat after manipulation, separated by condition.

of the errors and a "X" filled in the circle if they failed to find all of the errors.

Participants were randomly assigned to one of three goals. In the Hard goal condition, they were told that their goal was to score 3 points. In the Easy goal condition, they were told that their goal was to score 2 points. In the Reserve condition, they were also told their goal was to score 3 points. However, they were told, "Throughout these games, you will have one optional "emergency" point available. If you fail to find the errors in one passage, you can apply this emergency point and receive a point for that passage." After seeing the goals but before starting the task, all participants were asked, "How difficult do you expect it to be to find the errors in the passages?"

The first passage had four errors all within the first two lines; participants had 90 s to find the errors in the passage. This was a very easy task for participants. For the second passage, participants were told to find ten errors in 60 s. However, in reality, there were only nine errors. As a result, all participants failed to find all of the errors in this passage. Everyone received feedback that they did not find all the passages and received an "X" in the circle representing their goal progress. Participants in the Reserve condition were asked if they would like to apply their emergency point. If they chose to apply their emergency point, their progress circle turned grey with the words "emergency point" (rather than turning black as for an actual subgoal completion) (see Fig. 4 for the graphics). Participants who chose to not apply their emergency point were also asked why they chose to not apply their emergency point.

Participants in all conditions were then asked about their feelings of how this word search contributed to their feelings of progress toward this goal ("My performance on this word search suggests that I am getting further away from my goal"; "My performance on this word search will really decrease the chance of me reaching my goal.") and commitment towards their goal ("My performance on this word search suggests that I am not committed to my goal."; "My performance on this word search suggests that I must not care about my goal."). These measures of progress and commitment were adapted from Fishbach et al. (2006).

Participants were then told, "Since you were unable to find all the errors in the last passage, you have a choice of what you do next. Do you want to continue trying to reach your goal and try to find the errors in the last passage or do you want to give up and read funny memes instead?" The two response options were: "Continue trying to reach my goal and try to find the errors in the last passage" or "Give up on pursuing my goal and read funny memes instead." Participants were then directed to either the memes or an additional passage depending on their choice.

5.2. Results

In all of the following analyses, we analyze the data of all 903 participants who completed the study.

5.2.1. Perceptions of difficulty

First, we assessed if participants had different perceptions of the difficulty of the passages depending on the goal they were assigned. Participants may perceive that the passages would be more difficult in the Reserve condition and as a result feel more justified in failing, leading them to be more likely to persist. Participants did not perceive the passages to be differentially difficult depending on condition ($M_{Reserve} = 3.85$ vs. $M_{Hard} = 3.90$, $\beta = 0.045$, $p = .75$; $M_{Reserve} = 3.85$ vs. $M_{Hard} = 3.61$, $\beta = -0.24$, $p = .097$). Further, perceived difficulty of the passages did not predict the decision to try the last passage or not ($\beta = -0.04$, $p = .33$). Thus, we can rule out the alternate explanation that the emergency reserve changes participants' perceptions of difficulty of the task.

5.2.2. Persistence after failure

Next, we analyzed if participants tendency to continue with their goal (and try the last passage) vs. give up (and read memes) depended on the goal they were assigned to. We conducted a logistic regression predicting choice of continuing with their goal from two dummy variables representing the Hard and Easy conditions, with the Reserve condition as the reference group. We found that participants were significantly more likely to persist in the Reserve condition than those in both the Hard and Easy condition ($73.2\%_{Reserve}$ vs. $63.0\%_{Hard}$; $\beta = -.469$, χ^2 (1) = 7.03, $p = .008$; $73.2\%_{Reserve}$ vs. $65.2\%_{Easy}$; $\beta = -0.373$, χ^2 (1) = 4.40, $p = .036$). This replicates our earlier findings that individuals with reserve goals are more likely to persist after failure.

5.2.3. Use of emergency reserve

87.5% of participants chose to use their emergency reserve in the Reserve condition. Of those who chose to not use their emergency reserve, approximately 30% of participants reported they wanted to save the emergency reserve for later, 38% reported the emergency reserve was not necessarys, 11% reported that they did not earn a point so they felt that should not receive a point, and 21% reported various other reasons.

5.2.4. Process evidence

We next examined our proposed process: participants with goals with emergency reserves (vs those without emergency reserves) feel like they have made more progress after failing, leading them to feel more committed to their goal, and thus more likely to persist. We first examined participants' perceptions of progress. We regressed our measure of perceived progress ($\alpha = 0.80$) against two dummy variables representing the Hard and Easy condition with the Reserve condition as the reference group. Participants in the Reserve condition felt like they had made significantly more progress on their goal after failing the second passage than those in the Hard condition ($M_{Reserve} = 2.69$ vs. $M_{Hard} = 1.71$, $\beta = -0.980$, $p < .001$) and the Easy condition ($M_{Reserve} = 2.69$ vs. $M_{Hard} = 1.71$, $\beta = -0.299$, $p = .014$).

After finding that emergency reserves increased perceived progress, we examined how perceived progress influences commitment ($\alpha = 0.89$). We found that as participants felt more progress on their goal, they felt more committed to their goal ($\beta = 0.31$, $p < .001$). Next, we examined how commitment influences persistence. We found that as participants felt more committed to their goal, they were more likely to continue with their goal (and try the third game) ($\beta = 0.20$, χ^2 (1) = 24.48, $p < .001$)

Lastly, we conducted a serial mediation analysis. We found a significant serial mediation for both the Hard and the Easy condition compared to the Reserve condition, such that the reserve leads

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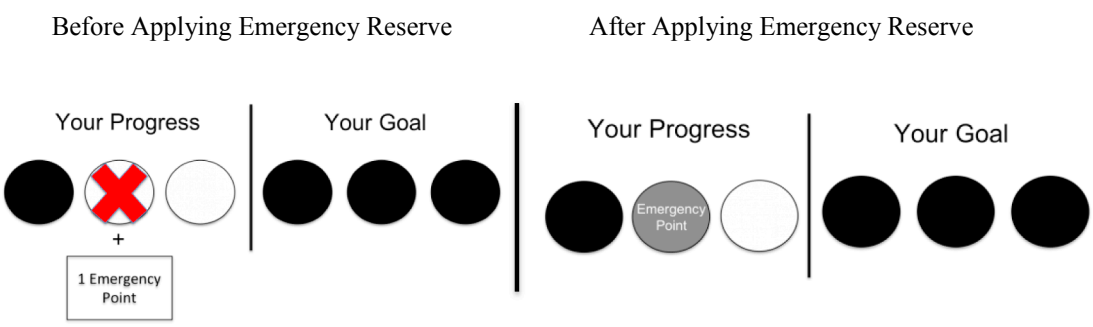

Fig. 4. Graphical display of progress in the Reserve condition before (left) and after (right) applying emergency reserve. Black circles represented successfully finding the errors in the passage; circles with Xs represented failing to find the errors in the passage; grey circles with the words "emergency point" represented applied emergency points after failing.

participants to feel a greater sense of perceived progress after failing the third word search, leading them to feel more committed to their goal, and thus more likely to persist. For the Hard vs. Reserve mediation (Reserve → more progress → greater commitment → more persistence) ($a_1 \times d_{21} \times b_2 = 0.06$), with a 95% confidence interval excluding zero (0.03–0.10)[4]. We found similar serial mediation evidence for Easy vs. Reserve: (Reserve → more progress → greater commitment → more persistence) ($a_1 \times d_{21} \times b_2 = 0.02$), with a 95% confidence interval excluding zero (0.004–0.048).

5.3. Discussion

This study replicated our finding that people with goals that include emergency reserves persist more after a subgoal failure than those with goals that do not include emergency reserves. Secondly, it demonstrated that this effect holds even if the graphical display of an "emergency point" is different than the graphical display for a point earned by actually completing the subgoal. Lastly, and importantly, this study demonstrates evidence of our proposed process: emergency reserves applied after a failure induce consumers to feel that they are making progress towards their goal, leading them to feel more committed and thus more likely to persist than those without emergency reserves.

In the next study, we aimed to determine if the timing of when people apply their emergency reserves is important. Prior research on the goal-gradient hypothesis has demonstrated that people are more motivated when they feel that they have made more progress towards their goal. In Kivetz et al. (2006), even the illusion of goal progress motivated consumers. For example, consumers who received a 12-stamp coffee card with two pre-existing bonus stamps were more motivated to buy coffee than those with a regular 10-stamp coffee card. Thus, a potential alternate explanation for our finding is that participants with Reserve goals feel like they have simply made more progress on their goal by the time of a subgoal failure than those with goals without emergency reserves, leading them to persist more after a failure. When participants fail to reach a subgoal, their emergency reserve allows them to still receive credit for that attempt (if it is within their reserve limit). For example, in our field study, a participant who has completed their step goal only two days might feel like they have completed the task three days if they applied their emergency skip in the emergency reserve condition, whereas those in the Hard and Easy condition would feel like they have completed the task only two days (see Fig. 1). Note, however, that this alternate explanation implies that the *timing* of the reserve or a bonus point is not an important part of the process – in other words, the reserve should not need to be applied after a subgoal failure in order to produce the observed effect. Just as the bonus coffee stamps were helpful before any coffee buying started, applying reserves at the very beginning of the set of tasks could have a similar effect.

We argue, however, that the timing of the reserve is an important component of the process when actual failures are involved, precisely because the reserve offsets a failure rather than simply representing a step forward toward the goal (note that there is really no sense of "failure" from not buying another coffee). In other words, we hypothesize that emergency reserves need to be applied after a subgoal failure in order to lead people to persist more. Otherwise, the direct experience of the subgoal failure will lead people to feel less committed to their goal and thus be less likely to persist. In Study 4, we examined if we could replicate the central finding that people with goals with emergency reserves persist more after a subgoal failure than those with goals without emergency reserves in a completely different domain and also test this alternate explanation by varying the timing of receiving a "bonus" or "emergency" point.

6. Study 4a: Word search failure study-timing of reserve

6.1. Procedure

402 participants (M_{age} = 34.91; Age Range: 18–72; 149 males) completed this survey from Amazon Mechanical Turk. The experiment began by explaining to participants that they would be completing training for a hard word search test that would take place at the end of the study. If they performed well on this final word search test, they could be eligible for a potential survey in the future. In order to train for the word search test, they would be asked to complete a series of training word searches. They were told that the more word searches they practiced, the more likely it is they would do better on the hard word search test. Participants did not have to successfully complete their training goal in order to try the final word search test.

Participants were then randomly assigned to one of four training goal conditions - Easy, Hard, Reserve, or Bonus – in which the goal for how many word searches they should complete (out of three) was manipulated. They were told they would receive one point for every training word search that they beat. In the Easy condition, participants' goal was to score two points. In the Hard, Bonus, and Reserve condition, participants' goal was to score three points. Participants in the Reserve condition were also told: "Throughout these games, you will have one optional "emergency" point available. If you fail to complete one word search, you can apply this emergency point and receive a point for that failed word search game." Participants in the Bonus condition were told, "You will start off this game with one free bonus point." Thus, participants in the Reserve condition would only receive

[4] In contrast to our proposed process model, the following alternative mediation pathways were not significant for Hard vs. Reserve: (Reserve → more progress → more persistence) ($a_1 \times d_{21} \times b_2 = 0.02$) and (Reserve → more commitment → more persistence) (($a_1 \times d_{21} \times b_2 = -0.04$), or for Easy vs. Reserve: (Reserve → more progress → more persistence) ($a_1 \times d_{21} \times b_2 = 0.001$) and (Reserve → more commitment → more persistence) (($a_1 \times d_{21} \times b_2 = 0.001$).

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their emergency point after failing a game whereas those in the Bonus condition would receive their bonus point before even starting any of the games. Similar to Study 2, goals were purely symbolic, and the games were described as training for the word search test that would take place at the end.

All participants then completed the very easy first word search. Participants were asked to find four words in three minutes; all participants were informed that they beat it. The second word search was very difficult, and most participants were unable to beat it. They were asked to find 10 words in 2 ½ min. After failing the second word search, participants in the Reserve condition were asked if they wanted to apply their emergency point. Thus, at this point in the survey, participants with Reserve goals and Bonus goals have two points; however, participants with Bonus goals received one bonus point at the very beginning of the survey and one point from the first game, while participants in the Reserve condition received one point from the first game and one emergency point after failing the second game.

After failing the second game, all participants read a description of the third word search game, in which there would be unlimited time to find 10 words. Participants were then asked to choose one of three options: (1) Try the third word search game and the word search test, (2) Skip the word search game and move on to the word search test, or (3) Skip both the word search game and the word search test. Based on their choice, participants were directed to either the third word search game, the final word search test, or the remaining questions of the survey. After every word search throughout the survey, participants saw a graphical representation of their goal and their progress.

6.2. Results

In all of the following analyses, we analyze the data of all 402 participants who completed the study. In the first logistic regression, the dependent variable was whether or not participants tried the third word search game, indicating whether or not participants still tried to reach their higher-order end goal. We found that participants with Reserve goals were significantly more likely to try the third word search game than those in the Easy condition ($84.7\%_{\text{Reserve}}$ vs. $64.0\%_{\text{Easy}}$; $\beta = -1.14, \chi^2\,(1) = 10.56, p = .001$), the Hard condition ($84.7\%_{\text{Reserve}}$ vs. $60.2\%_{\text{Hard}}$; $\beta = -1.30$, $\chi^2\,(1) = 14.11$, $p < .001$), and the Bonus condition ($84.7\%_{\text{Reserve}}$ vs. $66.3\%_{\text{Hard-Bonus}}$; $\beta = -1.03$, $\chi^2\,(1) = 8.66$, $p = .003$) (see Fig. 5).

In the second logistic regression, the dependent variable was whether or not participants gave up on not only the primary goal of trying the third word search but also the word search test entirely. We found that participants with Reserve goals were significantly less likely to give up than those in the Easy condition ($4.1\%_{\text{Reserve}}$ vs. $18.0\%_{\text{Easy}}$; $\beta = 1.64$, $\chi^2\,(1) = 8.20, p = .004$), the Hard condition ($4.1\%_{\text{Reserve}}$ vs. $23.3\%_{\text{Hard}}$; $\beta = 1.97$, $\chi^2\,(1) = 12.27$, $p < .001$), and the Bonus condition ($4.1\%_{\text{Reserve}}$ vs. $17.8\%_{\text{Hard-Bonus}}$; $\beta = 1.63$, $\chi^2\,(1) = 8.08$, $p = .004$).

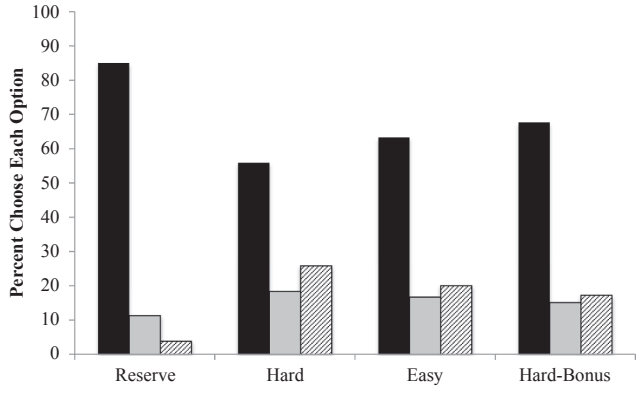

Fig. 5. Percent of participants who choose each option after failing the 2nd word search split by condition. The black bars represent the percent of participants who chose to try the 3rd word search and the word search test, the grey bars represent the percent of participants who chose to skip the 3rd word search and try the word search test, and the striped bars represent the percent of participants who chose both to skip the 3rd word search and the word search test.

6.3. Discussion

Study 4a replicated the finding from Studies 1, 2, and 3 that participants with goals that include emergency reserves are more likely to persist after failing a subgoal than those with goals that do not include emergency reserves. Additionally, this study demonstrates that the timing of applying the emergency reserve is an important part of the process. Participants with Reserve goals and Bonus goals had the same amount of progress by the end of the second word search, yet participants with goals with emergency reserves were more likely to persist after failing. Therefore, the benefits of emergency reserves appear to stem from replacing a sense of subgoal failure with progress at the specific time the failure happens.

While Study 4a found that participants were more likely to persist if a point was applied directly after failure vs. before failure, the labeling of the points was different—one was labeled "bonus" and the other labeled "emergency." Thus, it is possible that the differential effects observed between these conditions was the result of the labeling, rather than the timing of applying the point. In the next study, we hold constant the label and only manipulate the timing of applying the emergency point.

7. Study 4b: Reserve: Timing vs. label

196 participants ($M_{age} = 32.88$; Age Range: 18–75; 98 males) completed this survey from Prolific (selecting only participants in the US). The procedure of the study was identical to Study 4a. However, in this study, participants were randomly assigned to just one of two conditions: Reserve-Before Failure vs. Reserve-After Failure. In the Reserve-Before Failure condition, participants were told their goal was to score 3 points. Afterwards, they were told, "You will start off the games with one 'emergency' point." The graphic on the next page then filled in one circle, indicating they already had one point. In the Reserve-After Failure condition, participants were told their goal was to score 3 points. They were told, "you will have one optional 'emergency' point available. If you fail to complete one word search, you can apply this emergency point and receive a point for that failed word search game." Participants then were allowed to apply their emergency reserve immediately after failing the second word search. Thus, the "emergency" label is held constant in both conditions. The only difference is the ability to apply the reserve **after** the failure vs. starting off with the reserve **before** the failure.

7.1. Results

In all of the following analyses, we analyze the data of all 196 participants who completed the study. In the first logistic regression, the dependent variable was whether or not participants tried the third word search game, indicating whether or not participants still tried to reach their higher-order end goal. We found that participants who were able to apply their emergency reserve immediately after failure (Reserve-After Failure condition) were significantly more likely to try the 3rd word search than those who applied their reserve before the failure (Reserve-Before Failure condition) ($78.2\%_{\text{Reserve-AfterFailure}}$ vs. $54.7\%_{\text{Reserve-BeforeFailure}}$; $\beta = 1.07$, $\chi^2\,(1) = 11.21$, $p = .001$).

In the second logistic regression, the dependent variable was whether or not participants gave up on not only the primary goal of trying the third word search but also the word search test. We found that participants who were able to apply their emergency reserve

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immediately after failure (Reserve-After Failure condition) were marginally significantly less likely to give up entirely than those who were able to apply their emergency reserve earlier (Reserve-Before Failure condition) ($15.8\%_{\text{Reserve-AfterFailure}}$ vs. $25.3\%_{\text{Reserve-BeforeFailure}}$; $\beta = -0.600$, χ^2 (1) = 2.76, $p = .097$).

7.2. Discussion

Studies 4a and 4b test the boundary conditions of the emergency reserve's impact on persistence after failure by exploring differences in the labeling and timing of the emergency reserve. In Study 3, in addition to providing process evidence, we found that the visual cues associated with using an emergency reserve do not need to be the same as the visual cues from a success for the effect to hold. In Study 4a, the label on the extra point available to participants was changed from "emergency reserve" to "bonus", and the timing of that extra point was also changed, while Study 4b keeps the labels consistent ("reserves") but still manipulates the timing of its use. Consistently, the results suggest that emergency reserves increase persistence after failure only when they are able to be applied immediately after the failure, and not provided in advance. This further supports our proposed process that the emergency reserve lessens the sense of failure while making progress toward the goal, in contrast to the goal-gradient hypothesis which only speaks to illusion of progress toward the goal.

8. General discussion

This paper demonstrates the effectiveness of a cost-free nudge in increasing persistence after goal failure in one field study and four real behavior lab studies. More specifically, this paper reveals that framing goals with emergency reserves increases the likelihood that people persist after a subgoal failure by increasing the perceived sense of progress after a failure and thus commitment to the larger end goal. In Study 1, we demonstrated in a real-world setting that people with exercise goals framed with emergency reserves perform better than those with goals without emergency reserves. Importantly, people with goals framed with emergency reserves were more likely to persist after failing to reach their daily step goal (subgoal) compared to those whose goals did not have emergency reserves. In Study 2, we replicated this effect in a different domain, demonstrating that (1) participants with goals framed with emergency reserves persist more after a subgoal failure than those with goals framed without emergency reserves, and (2) participants with goals with emergency reserves persist the same amount after a subgoal failure as they do after a subgoal success, suggesting that the emergency reserve helps people maintain their effort after a failure. In Study 3, we replicate our effect with a different graphical representation of the emergency reserve and provide process evidence for our effect. In particular, we provided mediation evidence demonstrating that applying emergency reserves increases the perceived sense of progress after a subgoal failure, leading participants to feel more committed to their goal, and thus increasing their likelihood of persisting. In Study 4a and 4b, we replicated the effect that people with goals framed with emergency reserves persist more after a failure, and further revealed that the timing of applying the emergency reserve is an important component of the process, finding that increasing perceived progress through emergency reserves only after (and not before) a failure occurs leads to greater persistence.

8.1. Theoretical contributions

Prior research suggests that "grit," the tenacious pursuit of a dominant superordinate goal despite setbacks, leads people to be successful over and above IQ and conscientiousness (Duckworth, Peterson, Matthews, & Kelly, 2007). Therefore, the ability to persist after failure, in particular, has large real-word consequences. While prior research has primarily focused on how the characteristics of the goal affect people's overall performance (e.g., Locke & Latham, 1990; see Locke & Latham, 2002 for a review), less research has focused on how the characteristics or framing of the goal can impact how people respond to an explicit failure. While it might be more difficult to influence people's self-esteem, self-efficacy, or reason for failure, we demonstrate that merely the framing of a goal can have a great impact on how people respond to failure.

While prior research has documented many negative effects of setting too flexible goals and plans (Ainslie, 2001; Cheema & Soman, 2006; Shin & Milkman, 2016), this research contributes to some of the recent research demonstrating the possible benefits of framing goals with a sense of flexibility. For example, high-low goals (e.g., score 2–4 points) have been found to lead people to be more likely to pursue their goal again (Scott & Nowlis, 2013) and nonspecific goals have been found, in some situations, to lead people to persist and perform better than those with specific goals (Ülkümen & Cheema, 2011; Wallace & Etkin, 2017). Recent research has also demonstrated that people who were incentivized to complete flexible exercise routines compared to stricter exercise routines exhibited more persistent exercise behavior after the incentives were removed (Beshears, Lee, Milkman, & Mislavsky, 2017). Additionally, people who make more concrete plans were found to be more likely to fail to follow through with their plan than those with more broad plans (Yeomans & Reich, 2010). Thus, while strict plans and goals might be helpful in the short-term, this growing body of research suggests that framing goals with flexibility may help people persist in longer-term goals, where failure is more likely.

Further this work contributes to the literature on the goal-gradient hypothesis by revealing that even "perceived" progress rather than "real" progress can lead people to be more committed to their goal, and thus be more likely to persist after a failure. Crucially, it demonstrates that the timing of this perceived progress can dramatically influence people's persistence after a subgoal failure and thus performance in the long-term. The emergency reserve is one way in which a failure can be translated into an illusion of progress; future research can explore what would constitute an "emergency reserve" or an illusion of progress in other domains and develop other methods in which the psychological impact of failure can be reduced.

This paper contributes to the existing research on emergency reserves by demonstrating the effectiveness of emergency reserves in a field experiment as well as a particular benefit of structuring goals with emergency reserves. Besides the effects of reserves on individuals' efforts to try to reach a difficult reference point (Sharif & Shu, 2017), individuals are also more likely to persist after a failure when their goal is framed with emergency reserves. Both of these benefits may contribute to why people with goals framed with emergency reserves perform better on their goals. Further, this research demonstrates how people psychologically perceive applying the emergency reserve. Participants with goals with emergency reserves are equally likely to persist after a subgoal success as they are after failing to reach their subgoal and applying their emergency reserve. Thus, the emergency reserve is able to transform a feeling of subgoal failure into subgoal success.

There are still open questions about the ability of the emergency reserve to help people persist after a failure. We found that the emergency reserve was equally as effective across the four weeks of Study 1. However, it is possible that the emergency reserve will become less effective over the course of months. Future research should examine the long-term effectiveness of emergency reserves. Further, in these studies, we only examined the effectiveness of emergency reserves to help people persist after failure when there were a limited number of emergency reserves available (e.g., 2 emergency reserves per week). We expect that people will continue to persist after failure if they have more emergency reserves available (e.g., 4 emergency reserves per week); however, we expect that people will be more likely to take advantage of them as well (try less hard to avoid failure). As a result, we

expect that the overall benefit of the emergency reserve will be lower when there are too many emergency reserves.

8.2. Practical implications

People feel more time-pressured than ever (e.g., Roxburgh, 2004). At work, people have a multitude of tasks, deadlines, and meetings each day. Emergency reserves could be included in a wide variety of ways for employees. For example, employees could receive a bonus for arriving to work every day on time or completing every soft deadline on time for a year, but managers could include two free emergency passes from arriving late to work per year or two emergency deadline extensions for tasks each year. This would ensure that even if employees could not make it on time to work/meet a deadline one or two times of the year, they would still be motivated to continue arriving on time afterwards, in contrast to the previously on-time laundry workers in Gubler, Larkin, and Pierce (2016) who give up on timely attendance after a single failure.

Further, framing organizational goals with emergency reserve may possibly reduce employee stress, and thus reduce the chances of worker-related burnout (Shirom, 2003; Sonnentag, Binnewies, & Mojza, 2010; Halbesleben & Buckley, 2004). Workers experience often physical, emotional, or cognitive demands that may deplete their self-regulatory resources (e.g.,Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). As a result, people may focus their attention on the most salient, proximal, and rewarded goals (e.g., Schmidt & DeShon, 2007). With people focusing more and exerting more effort on primary tasks (e.g., on time delivery, maximizing investment returns), they may exhibit selective impairment on low-priority task component (Hockey, 1993, 1997). For example, people are less likely to comply with perceived secondary tasks, such as professional standards (such as hand-hygiene), the longer that they have been at work (e.g., Dai, Milkman, Hofmann, & Staats, 2015; Hansez & Chmiel, 2010). Even though performance on primary tasks may be maintained as employees become increasingly fatigued, employees may fail to complete these secondary tasks. Failing to complete one of these secondary tasks at the beginning of the day may lead them to give up entirely on trying to complete other secondary tasks later on. Managers should consider framing these secondary tasks with emergency reserves to reduce the negative consequence of task-related failure.

Switching from organizational to personal concerns, due to spending increasingly more time at work, individuals have less time to complete the activities involved in their pursuit of other long term goals, such as becoming more fit (e.g., Banwell, Hinde, Dixon, & Sibthorpe, 2005; Strazdins, 2011). People may fail to go to the gym one day due to having an unusually busy day at work, end up skipping the next few days, and then decide to no longer pursue their overall health goal. This work suggests that if employees framed their goals with emergency reserves, they would be more likely to persist after this initial failure. The health of employees additionally has implications for the organizations they are a part of. Prior research has demonstrated the positive benefits of exercise on overall well-being and also on worker productivity (Bandura, 2004; Faragher, Cooper & Cartwright, 2004). Further, better health of employees also will lead to lower health care costs for organizations. Therefore, this research suggests a practical way to help a wide range of people persist after a failure, and thus be more likely to reach their long-term goals.

More broadly, the use of emergency reserves in the framing of goals represents a choice architecture intervention that preserves individual choice without changing financial incentives, and yet still leads to tangible performance benefits. The individuals with emergency reserves in our field experiment took up to 20% more steps and reached individual step goals on 40% more days than individuals without reserves. Creating the framing took less than an hour of additional time during our development of the spreadsheets we used to allow individuals to track their steps. Assuming standard web development hourly rates ($60), as well as our average daily difference in steps per condition (6661.81_{Easy} vs. $7981.27_{\text{Reserve-Monthly}}$), this suggests an increase of around 800,000 steps per year per dollar spent for a population of 100 individuals. Consistent with other recent findings (Benartzi et al., 2017), these sorts of low-cost nudges are highly efficient at generating substantially large effects on behaviors.

8.3. Conclusions

Throughout long-term goal pursuit, people are bound to experience at least one failure. Unfortunately, those subgoal failures can become very costly if they cause individuals to give up on their overall goals, whether it to be save money and escape debt (Steiner, 2013) or to lose weight and keep it off (Brody, 1991; Hellmich, 2013). The good news is that the cognitive framing of a goal, and perceived progress on a goal, can impact people's persistence in the face of such failure. Specifically, the research presented here demonstrates how a cost-free nudge, framing goals with emergency reserves, can encourage people to persist after a failure, helping people reach these long-term goals they have been struggling to achieve.

Appendix A. Supplementary mateiral

Supplementary data to this article can be found online at https://doi.org/10.1016/j.obhdp.2019.01.004.

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