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Immediate Rewards Predict Adherence to Long-Term Goals

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Abstract

People primarily pursue long-term goals, such as exercising, to receive delayed rewards (e.g., improved health). However, we find that the presence of immediate rewards is a stronger predictor of persistence in goal-related activities than the presence of delayed rewards. Specifically, immediate rewards (e.g., enjoyment) predicted current persistence at New Year's resolutions whereas delayed rewards did not (Study 1). Furthermore, immediate rewards predicted persistence in a single session of studying and exercising whereas delayed rewards did not, even though people report primarily pursuing these activities for delayed rewards (Studies 2 and 3). This is true for both short (1 week) and long (3 month) time frames (Study 4), and regardless of whether anticipated or materialized rewards are assessed (Study 5). Overall, whereas delayed rewards may motivate goal setting and the intentions to pursue long-term goals, a meta-analysis of our studies finds that immediate rewards are more strongly associated with actual persistence in a long-term goal.

Keywords

immediate/delayed rewards, long-term goals, persistence, motivation

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People who save money to pay off debt, those trying to quit smoking, and others looking to motivate themselves to exercise and get in shape all share a common interest: the desire to pursue a long-term goal. People often pursue long-term goals, including these, to receive delayed rewards such as financial security or improved health. Continual engagement in goal-related activities is crucial for receiving these delayed outcomes and by definition, long-term goals require a person to persist in the activity over time (Baumeister & Tierney, 2011; Hofmann, Friese, & Strack, 2009; Loewenstein, 1996; Mischel, Cantor, & Feldman, 1996; Wilkowski & Ferguson, 2016). Although people highly value receiving delayed outcomes from their goal pursuit, they at times struggle to pursue these goals.

Previous research offers one strategy for how to motivate pursuit of long-term goals: attending to the delayed rewards the goal provides (Kuhl & Beckmann, 1985; Mischel, Shoda, & Rodriguez, 1989). For example, valuing the delayed outcome of losing weight should motivate a person to eat healthily to achieve this outcome. To the extent that goal-related activities are engaged in because people value the outcomes of their pursuit, it follows that the more delayed rewards people receive, the longer they should persist in the activity. However, we suggest the presence of immediate rewards, such as enjoying the positive taste of healthy foods, can help increase persistence in these long-term goals to an even greater extent. In what follows, we explore the relationship between immediate and delayed rewards for persistence in long-term goals. Although these self-control activities are pursued for the delayed rewards they provide, the presence of immediate rewards is a stronger predictor of persistence than delayed rewards.

Rewards From Long-Term Goals

In understanding what drives persistence in long-term goals, we distinguish between two benefits people receive during goal pursuit: immediate and delayed rewards. Immediate rewards materialize during activity pursuit and make up the experience of pursuing activities, whereas delayed rewards materialize at a later point in time and are an outcome of pursuit (Ainslie & Haslam, 1992; Mischel et al., 1989; Trope & Fishbach, 2000). For example, studying at a library can provide immediate rewards (e.g., learning about an interesting topic) and delayed rewards (e.g., performing well on an exam), and saving money provides rewards in the moment (feeling proud or virtuous) along with delayed rewards (financial security).

This distinction between immediate and delayed rewards is similar to that between intrinsic and extrinsic incentives

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(Deci & Ryan, 1985; Heath, 1999; Higgins & Trope, 1990; Kruglanski, 1975) and experiential and instrumental benefits (Fishbach & Choi, 2012). Thus, immediate rewards, such as the positive taste of healthy food, are often intrinsic and experiential, whereas delayed rewards, such as improved well-being from healthy eating, are extrinsic and instrumental (Woolley & Fishbach, 2015). Although these frameworks do not completely overlap, they share the assumption that a person can receive intrinsic, immediate rewards as part of pursuing an activity, and can also receive delayed, extrinsic rewards that are an outcome of pursuit. Therefore, immediate rewards are often closely associated with and experienced similar to intrinsic incentives.

Self-control research has addressed the conflict that arises when pursuing activities that trade off between immediate and delayed rewards (e.g., Fishbach & Converse, 2010; Mischel et al., 1996). Although self-control conflicts are pervasive, they are not inherent in pursuing long-term goals and delayed rewards need not come at a cost to the immediate experience. Indeed, whenever people are intrinsically motivated to pursue activities that are associated with long-term goals, they receive immediate and delayed rewards from the same action, and pursuing long-term goals no longer poses a self-control conflict. For example, at work people receive delayed rewards (e.g., a paycheck) and immediate rewards (e.g., learning new skills). Most activities people pursue to advance their long-term goals typically contain both immediate and delayed rewards to some degree (Etkin, 2016; Fishbach & Choi, 2012).

Immediate Rewards Increase Goal Persistence

What determines activity persistence (e.g., behavior maintenance) at any given point is the perceived value of that activity relative to the costs of continuing (Rothman, 2000; Rothman, Baldwin, Hertel, & Fuglestad, 2004). We predict that although long-term goals are initiated for the delayed rewards they provide, immediate rewards more strongly predict value and therefore, persistence in goal-related activities than do delayed rewards. For one, immediate rewards could be beneficial for persistence because they are highly attractive in the present (Ainslie, 2001; Rachlin, 2000). Indeed, immediate rewards are more important to people during pursuit of an activity than outside pursuit (Woolley & Fishbach, 2015). For example, studying an interesting (vs. boring) topic at the library may be more valuable during a study session than before or after. If people value receiving immediate rewards during activity pursuit, the presence of these rewards may have a great influence on goal persistence.

Immediate rewards further decrease opportunity costs of persisting in a goal activity, as a cost-benefit analysis often appears to favor immediate rewards (Botvinick & Braver, 2015; Kurzban, 2016; Kurzban, Duckworth, Kable, & Myers, 2013). Moreover, unlike delayed rewards, immediate rewards make up the positive experience of activity pursuit and could increase intrinsic motivation to engage in an activity (Custers & Aarts, 2005; Erez & Isen, 2002; Ferguson & Bargh, 2004). Although delayed rewards can also provide a positive experience, which is anticipated (delayed), the actual immediate positive experience is often stronger than the anticipated experience of achieving delayed outcomes. To the extent that immediate rewards are inherent in activity pursuit, we expect them to increase persistence, and even more so than delayed rewards. In addition, immediate rewards should increase persistence in a single session (e.g., minutes spent in a given workout) as well as over time (e.g., hours spent exercising every week over some period).

Naturally, the presence of delayed rewards is also relevant for persistence in long-term goals. Indeed, individuals attend to the long-term goals their actions achieve to motivate themselves and others (Carver & Scheier, 1998; Heath, Larrick, & Wu, 1999; Higgins, 1987; Locke & Latham, 1990) and considering long-term benefits in particular is beneficial for action initiation (Fishbach & Choi, 2012). Furthermore, delayed rewards could increase interest in pursuing a long-term goal through regulatory fit (Higgins, Cesario, Hagiwara, Spiegel, & Pittman, 2010), as these goals are primarily pursued for the delayed benefits they provide. However, whereas delayed rewards may predict persistence in long-term goals, our main hypothesis is that immediate rewards predict persistence even more strongly.

Overview

We examine the relationship between immediate versus delayed rewards and persistence in long-term goals (e.g., healthy eating, exercising). We predict that immediate rewards are a stronger predictor of persistence than are delayed rewards, even though long-term goal activities are primarily pursued for the delayed rewards they provide.

As an initial test of our hypothesis, Study 1 surveys individuals pursuing a New Year's resolution to assess their persistence in this resolution after 2 months (17% into the annual goal). We predict that immediate rewards more strongly predict persistence than delayed rewards. We next ask whether immediate or delayed rewards better predict persistence in an activity within a single session. Accordingly, Study 2 assesses students' persistence studying at a library based on the presence of immediate rewards (interest in the materials) versus delayed rewards (importance of materials).

Beyond the presence of rewards, we expect that the value assigned to rewards should matter. Hence, in Study 3, we measure gym-goers' valuation of immediate and delayed rewards, predicting that the valuation of immediate rewards more strongly predicts their current persistence in a workout. In Study 4, we explore the robustness of the effect, hypothesizing that immediate rewards predict long-term engagement: consumption of green vegetables over a week and exercising over 3 months. Last, Study 5 assesses whether the

timing of reward measurement—in anticipation versus in retrospect—influences the pattern of results. We predict that immediate rewards more strongly predict persistence in a healthy behavior (carrot consumption) than delayed rewards, regardless of whether these rewards are assessed before or after consumption. We disclose all studies testing our hypotheses and all measures within each study.

Study 1: Immediate Rewards Predict Persistence in New Year's Resolutions

We tested whether immediate and delayed rewards predict adherence to New Year's resolutions. People often commit themselves to achieving various goals at the start of a new year (Dai, Milkman, & Riis, 2014; Marlatt & Kaplan, 1972; Norcross, Mrykalo, & Blagys, 2002). Although people typically set New Year's resolutions to achieve a delayed outcome, we predict that the immediate rewards received when pursuing a resolution are a stronger predictor of persistence in the goal than the delayed rewards. We measured actual persistence after 2 months (17% of the annual goal) and also asked participants about their planned persistence for the rest of the year. We further predicted that unlike actual persistence to date, the presence of delayed rewards predicts future expectations of persistence at least as much as the presence of immediate rewards.

Method

Participants. In January, we recruited 242 Amazon Mechanical Turk (Mturk) workers and recorded their New Year's resolution.[1] Of those we contacted, 200 workers indicated setting a resolution. We invited these 200 workers to participate in the current study during the first week in March, that is, after 2 months of working (or not) toward their resolution. A total of 96 workers accepted the invitation and completed the survey (30 females; M_{age} = 34.81, SD = 10.50). Participants received US$0.20 for participating in the study. Post hoc power analyses conducted in G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) for each study showed that based on the respective sample sizes, an alpha probability of .05, and detection of a medium sized effect (f^2 = .15), power was sufficient (i.e., ≥.80).

Procedure. Participants recalled the main resolution they made in January and selected the phrase that most closely described their resolution from the following 10-item set, which we organized into three categories: (1) health: (a) exercising, (b) healthy eating, (c) having healthier habits; (2) work: (d) saving money, (e) getting organized, (f) learning something new, (g) getting out of debt; and (3) social: (h) spending time with family, (i) helping others, (j) enjoying life. If no option applied, participants wrote a short phrase that described their resolution under "other." We find 55.2% of resolutions were health related (exercise: 31.3%, eat healthy: 10.4%, have healthier habits: 13.5%), 34.4% were work related (save: 20.8%, get out of debt: 12.5%, learn something: 0%, get organized: 1.0%), and 5.2% were social goals (spend time with family: 2.1%, help others: 0%, enjoy life: 3.1%) with the remaining 5.2% comprising "other."

After indicating their primary resolution, participants completed measures assessing immediate rewards for pursuing their resolution: (a) "Is (selected resolution) something that provides you with a positive experience?" (b) "Is (selected resolution) enjoyable for you to do?" and (c) "Is (selected resolution) engaging for you to do?" and delayed rewards: (a) "Is (selected resolution) useful to you?" (b) "Will (selected resolution) change your life?" and (c) "Is (selected resolution) important for you to do?" (1 = *not at all*, 7 = *very much*). Next, to assess goal persistence, participants answered: "It's been over 2 months into the New Year so far. Over this 2-month period, how successful have you been at sticking with this resolution?" (1 = *not very successful*, 7 = *very successful*). We also measured participants' expected future goal persistence: "How likely do you expect you are to stick with this resolution in the upcoming months?" (1 = *not very likely*, 7 = *very likely*).

Results and Discussion

To confirm immediate rewards were perceived as arriving more immediately than delayed rewards, 80 participants approached on a college campus (M_{age} = 25.79, SD = 6.39) rated the immediate rewards (positive experience, enjoyable, engaging; α = .71) and delayed rewards (useful, life changing, important; α = .78) on "when you believe each benefit is delivered" (0 = *immediately while I do it*, 6 = *with a delay after I do it*). Paired t tests revealed immediate rewards were perceived as arriving more immediately than delayed rewards ($M_{immediate}$ = 2.32, SD = 1.24; $M_{delayed}$ = 3.62, SD = 1.30), $t(79) = 8.05$, $p < .001$, 95% confidence interval [CI] = [0.98, 1.62], d = 0.90.

Moving to testing our hypothesis, we collapsed the items measuring presence of immediate and delayed rewards ($\alpha_{immediate}$ = .85; $\alpha_{delayed}$ = .82; r = .38, $p < .001$). We regressed current goal persistence (M = 4.79, SD = 1.56) simultaneously on immediate and delayed rewards (we report standardized betas for all studies). As predicted, we find an effect of immediate rewards, β = .31, SE = .10, $t(93) = 2.97$, p = .004, 95% CI = [0.12, 0.61], whereas the effect of delayed rewards was not significant, β = .14, SE = .10, $t(93) = 1.31$, p = .193, 95% CI = [−0.13, 0.64]. Figure 1 provides a summary of the main results for Studies 1 to 5. Notably, the sample in each individual study was too small to reliably identify differences between regression coefficients. We report this analysis in a meta-analysis, where we find that immediate rewards were a stronger predictor of persistence than delayed rewards, across studies.

Next, we regressed expected future goal persistence (M = 5.71, SD = 1.31) on immediate and delayed rewards. Both

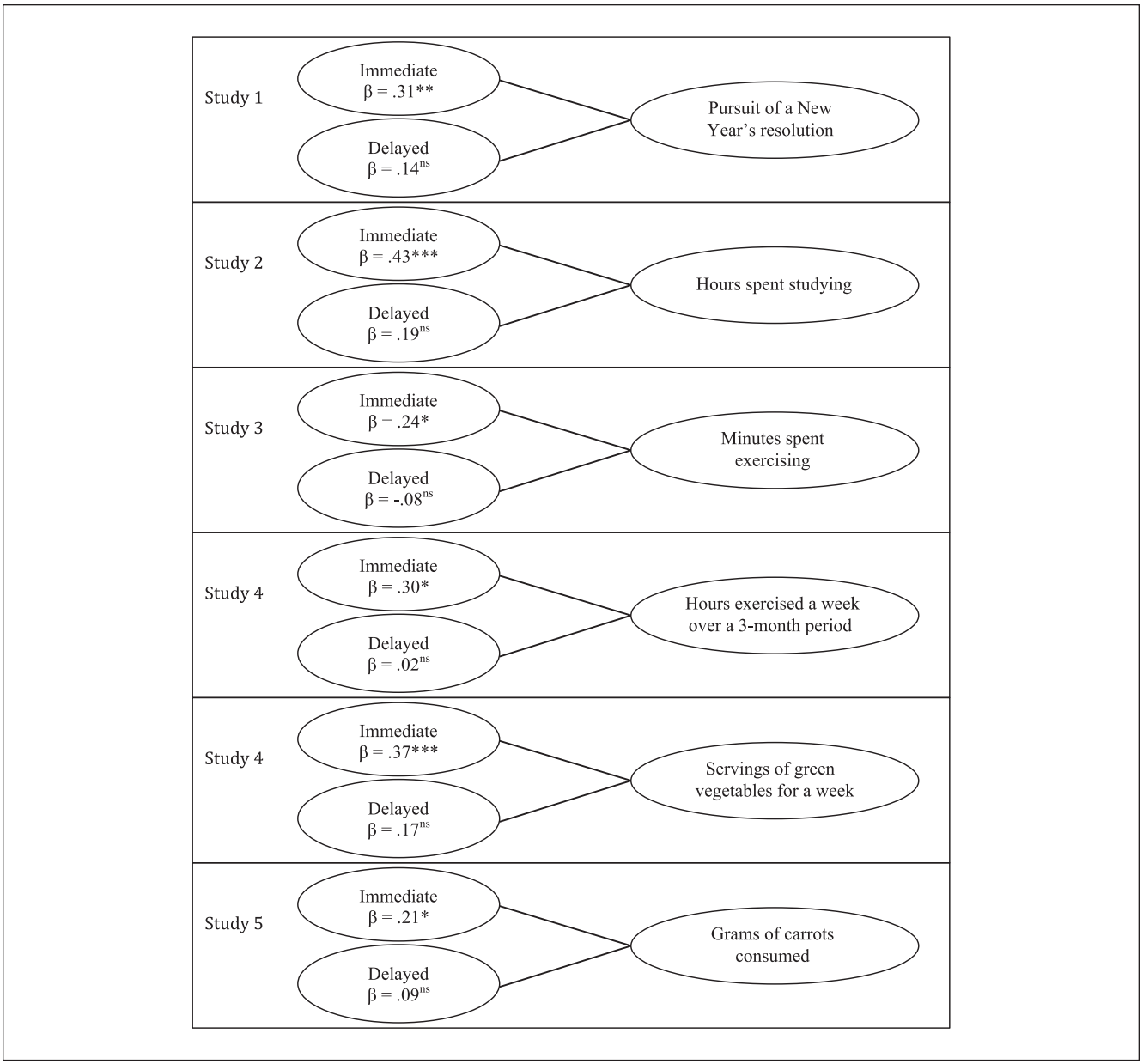

Figure 1. Summary of regression analyses for Studies 1 to 5.
Note. ns = not significant. * = $p < 05$, ** = $p < .01$, *** = $p < .001$.

immediate rewards, β = .19, *SE* = .10, $t(93) = 1.99$, $p = .049$, 95% CI = [0.001, 0.38], and delayed rewards, β = .42, *SE* = .10, $t(93) = 4.40$, $p < .001$, 95% CI = [0.36, 0.96], predicted expected future persistence. Thus, although only immediate rewards predict current persistence toward their resolutions, people believe both immediate rewards and delayed rewards matter for their future success.

One possible reason why delayed rewards may be a poor predictor of actual persistence is that there is no variance on the delayed variable. If, for example, everyone rated the delayed rewards as extreme (7, on our scales), it would be statistically impossible for this variable to predict anything. We conducted a Levene's test for equality of variances and found that indeed, the variance for delayed rewards was smaller than for immediate rewards ($SD_{immediate} = 1.31$, $SD_{delayed} = 0.83$), $F = 19.98$, $p < .001$. However, it is unlikely that the effect of immediate rewards on persistence is driven by the greater variance of immediate (vs. delayed) rewards because we find that delayed rewards significantly predict expected future persistence. The relationship with expected engagement suggests the variance for delayed rewards was sufficiently large.

In short, Study 1 finds that only immediate rewards significantly predict persistence in a New Year's resolution.

However, the presence of both immediate and delayed rewards predicts participants' expectations for their future goal persistence. Thus, participants who viewed pursuing their resolution as more enjoyable and more important believed they would be more successful at sticking with their resolution in the future, although only enjoyment predicted current persistence.

This study is not without limitations. First, our measure of persistence relies on participants' self-report and is therefore open to biases (although overestimates should not necessarily influence the pattern of rewards-persistence relationships). Second, we assessed rewards and goal persistence at the same point in time. Accordingly, in the next study we measured anticipated rewards at Time 1 and persistence in an academic goal, studying in a library, at Time 2.

Study 2: Immediate Rewards Predict Hours Spent Studying

Study 2 examined the extent to which immediate versus delayed rewards predict college students' persistence studying at a library. Students primarily study to achieve positive delayed outcomes. Indeed, even if students study for an exam the next day (a short-term subgoal), their goal to succeed academically is rooted in the long-term benefits such success entails. Yet we predict that immediate rewards are more strongly associated with persistence than delayed rewards. Specifically, we tested whether students' enjoyment of their study materials (immediate reward) is a stronger predictor of persistence than the importance of their study materials (delayed reward).

We first confirmed that people primarily go to the university library for the delayed rewards they receive, rather than for immediate rewards. A total of 40 students (16 female; $M_{age} = 24.48$, $SD = 5.38$) entering a school library listed "The main reason why you go to the library?" by checking one of two boxes ("To receive short-term benefits" or "To receive long-term benefits"). A significant majority (70%, $n = 28$; $z = 2.37$, $p = .018$, 95% CI = [0.55, 0.83]) of students attend the library to receive delayed rewards. Participants also answered: (a) "Do you go to the library to work on important materials?" (yes/no), (b) "Do you go to the library to work on enjoyable materials?" (yes/no), and (c) "How many days a week do you go to the library?" ($M = 4.28$ days, $SD = 1.57$). Students were significantly more likely to report attending the library to work on important materials (95%, $n = 38$) than enjoyable materials (60%, $n = 24$; McNemar $\chi^2 = (1, N = 40) = 12.07$, $p < .001$). Confirming that participants primarily study for delayed rewards, we tested our prediction that the presence of immediate rewards more strongly predicts persistence studying than the presence of delayed rewards.

Method

Participants. An experimenter approached 79 undergraduate and graduate students in a campus library who completed a survey in return for candy (46 females; $M_{age} = 25.14$, $SD = 4.75$). Of those approached, 68 (86.1%) completed the follow-up form indicating when they stopped studying and were included in the analysis (42 females; $M_{age} = 25.12$, $SD = 5.00$). Participants were working on various tasks (thesis research, homework for specific course, etc.). We note that we find no differences between respondents and nonrespondents for the measures we did collect (rated importance of study materials, enjoyment of materials, and weekly library attendance, ts < 1).

Procedure. Participants first completed a short survey indicating "What task are you working on right now?" and answered a question mapping onto the presence of delayed rewards—"How important are the materials you are working on?"—and the presence of immediate rewards—"How enjoyable are the materials you are working on?"—on a 7-point scale (0 = *not at all*, 6 = *very important*/*enjoyable*). Participants also reported how many days they spent in the library the past week.

Participants indicated what time they started their current task and were asked to indicate the time they finished working on their current material. They read, "This could be to take a snack break, to switch to another task (even if you stay at the library), to go home, etc." Participants were provided with the phone number and email address of a different experimenter and reported the time they finished working, allowing us to compute their total hours spent in the library working on their material.

Results and Discussion

Another group of participants (see Study 1) confirmed our measures: The immediate reward (i.e., enjoyment) was perceived as arriving sooner than the delayed reward (i.e., importance), $M_{immediate} = 1.25$, $SD = 1.48$; $M_{delayed} = 3.28$, $SD = 1.82$), $t(79) = 8.56$, $p < .001$, 95% CI = [1.55, 2.50], $d = 0.96$.

To test our hypothesis, we excluded responses three standard deviations above the mean (i.e., >12.9 hr a week; $n = 1$). We regressed the total hours worked ($M = 3.96$, $SD = 2.55$, skewness = 1.07) simultaneously on importance and enjoyment ($r_{importance,enjoyment} = .13$, $p = .293$). As predicted, we find an effect of immediate rewards, $\beta_{immediate} = .43$, $SE = .11$, $t(64) = 3.95$, $p < .001$, 95% CI = [0.35, 1.07], whereas the effect of delayed rewards was only marginally significant, $\beta = .19$, $SE = .11$, $t(64) = 1.75$, $p = .084$, 95% CI = [−0.06, 0.86] (Figure 1).

Levene's test for equality of variances found that the variances for delayed rewards (i.e., importance; $SD = 1.22$) and immediate rewards (i.e., enjoyableness; $SD = 1.55$) were similar ($F = 2.64$, $p = .106$), suggesting differences between the predictive power of these measures should not be attributed to differences in their variances. Overall, Study 2 finds evidence that immediate rewards predict students' actual persistence studying in a library whereas delayed rewards only marginally

predict studying, even though students indicate they mainly study for delayed outcomes. This finding is counterintuitive in that if people are going to the library because it is important for them, they should persist longer the more important, rather than enjoyable, studying is. Notably, in this study, we assessed subjective reports of study time. In the next study, we accordingly moved to observing participants during a workout to more accurately measure persistence.

Study 3: Immediate Rewards Predict Workout Persistence

The value assigned to immediate and delayed rewards, in addition to their presence, should also matter for persistence such that those who value immediate rewards may persist longer than those who emphasize them less. Accordingly, Study 3 examined gym-goers' current valuation of immediate and delayed rewards as predictors of the amount of time spent exercising. Although previous research has confirmed that people primarily go to the gym to receive delayed rewards (e.g., improved health, keeping in shape), rather than immediate rewards (Woolley & Fishbach, 2016), we predict that the valuation of immediate rewards (e.g., a workout that is enjoyable) is more strongly associated with workout length than the valuation of delayed rewards (e.g., a workout that is useful for keeping in shape).

Method

Participants. An experimenter invited 80 gym-goers in a campus gym to complete a short survey in return for a granola bar (48 females; M_{age} = 25.41, SD = 9.16). Participants were approached before starting an exercise on a cardio machine.

Procedure. Participants first indicated which cardio machine they would use that day (e.g., treadmill; most gym users only use one machine) and then answered a question mapping onto their valuation of immediate rewards of their current workout—"How important is it that your exercise today is enjoyable and fun?"—and their valuation of delayed rewards of their current workout—"How important is it that your exercise today is useful and effective at keeping you in shape?" (0 = *not at all important*, 6 = *very important*). Whereas participants indicated the importance of these rewards for their current workout, the rewards arrived either while they exercise (immediate) or as a result of exercising (delayed). Participants indicated how many days a week they typically workout and filled out demographic questions.

After assessing immediate and delayed rewards, we recorded total minutes participants spent exercising in the cardio room on their selected machine. We note students at the campus gym mainly select one cardio machine and workout on that for a set amount of time (35 min on average), rather than switch between machines. We also estimated the total number of minutes participants spend working out on a cardio machine during a given week using extrapolation: We multiplied the minutes spent working out on that particular day we observed them by the number of days a week they reported typically working out. Note that this only estimates time spent in the cardio room and does not include time spent in other rooms or any exercise completed outside of the gym (e.g., club sports, outdoor activities).

Results and Discussion

Another group of participants (see Study 1) confirmed our measures: The immediate reward variable (an exercise that is enjoyable and fun) was perceived as arriving more immediately than the delayed reward variable (an exercise that is useful and effective at keeping you in shape; $M_{immediate}$ = 1.67, SD = 1.26; $M_{delayed}$ = 3.32, SD = 1.67), $t(78) = 9.47$, $p < .001$, 95% CI = [1.30, 1.99], $d = 1.07$.

Analyzing the main study participants, the majority selected a treadmill (51.2%, n = 41) or an elliptical machine (40.0%, n = 32) to exercise on, with 7.5% (n = 6) selecting a bike and 1.3% (n = 1) a rowing machine. To test the hypothesis, we regressed minutes spent exercising (M = 34.71, SD = 17.86, skewness = .62) simultaneously on usefulness and enjoyableness of the workout ($r_{usefulness,enjoyableness}$ = .21, p = .063). As predicted, we find a significant effect of immediate rewards, β = .24, SE = .11, $t(77) = 2.10$, $p = .039$, 95% CI = [0.17, 6.51], whereas the effect of delayed rewards was not significant, β = −.08, SE = .11, $t < 1$ (Figure 1). The variances for delayed rewards (i.e., useful; SD = 0.93) and immediate rewards (i.e., enjoyable; SD = 1.27) were similar (Levene's test $F = 3.30$, $p = .071$). There were no differences in importance of immediate rewards, $F < 1$, or delayed rewards, $F < 1$, based on participants' choice of exercise workout.

We ran a separate analysis regressing our estimation for total number of minutes spent working out on a cardio machine for a given week (M = 147.40, SD = 98.64, skewness = .92) on importance of immediate and delayed rewards. We find immediate rewards are a significant predictor of persistence, β = .24, SE = .11, $t(77) = 2.12$, $p = .038$, 95% CI = [1.09, 35.90]; the more important immediate rewards were, the longer a person exercised on a cardio machine in a typical week, with no effect of delayed rewards, β = .06, SE = .11, $t < 1$.

Interestingly, an exploratory analysis on the number of days participants indicated typically spending at the gym in a given week (M = 4.08, SD = 1.29) on immediate and delayed rewards revealed no effect of immediate rewards, β = .12, SE = .11, $t(77) = 1.03$, $p = .306$, 95% CI = [−0.11, 0.34], whereas delayed rewards predicted weekly attendance, β = .23, SE = .11, $t(77) = 2.01$, $p = .048$, 95% CI = [0.002, 0.62]. This result could suggest that, consistent with Study 1, delayed rewards predict exercising plans (number of days people plan to exercise in a week), although not the actual amount of time they spend exercising.

We find that the valuation of immediate rewards increases persistence in a workout, whereas the valuation of delayed

rewards does not. Even though participants report valuing delayed rewards over immediate rewards when exercising ($M_{delayed}$ = 4.91, SD = 0.93; $M_{immediate}$ = 3.93, SD = 1.27), $t(79) = 6.27$, $p < .001$, 95% CI = [0.67, 1.30], $d = 0.70$, only the importance of having a fun workout significantly predicts the amount of time they spend exercising. We note that a limitation of this study is that we do not assess the vigorousness of the exercise (e.g., treadmill pace), which we are able to address in our final study (Study 5).

Study 4: Immediate Rewards Predict Continued Engagement in Healthy Habits

To address the possibility that immediate rewards only predict short-term engagement (e.g., persistence in a single workout session), Study 4 measured healthy habit engagement (exercise and vegetable consumption) over time. Specifically, we assessed a weekly pattern of exercising over 3 months, and the total number of meals containing green vegetables consumed over 1 week. We hypothesize that the presence of immediate rewards is a stronger predictor of continued engagement in healthy habits than the presence of delayed rewards, even though people report pursuing these habits to receive delayed rewards.

Method

Participants. An experimenter approached 85 visitors at a museum and invited them to complete a short survey on their pastimes and activity pursuits in return for candy (53 females; M_{age} = 40.38, SD = 15.51).[2] Participants completed the study in an area dedicated to learning about and participating in behavioral research.

Procedure. Participants first answered questions about their exercise habits: "How important do you find it to exercise?" (delayed rewards) and "How fun do you find it to exercise?" (immediate rewards; 0 = *not at all important/fun*, 6 = *very important/fun*). Participants next answered questions about green vegetable consumption: "How important for your health do you find it to eat green vegetables?" (delayed rewards) and "How tasty do you find it to eat green vegetables?" (immediate rewards; 0 = *not at all important/tasty*, 6 = *very important/tasty*).

To assess a pattern of continued engagement in these pursuits over time (3 months for exercising and 1 week for healthy eating), participants answered: "In the past 3 months, how many hours in a typical week did you exercise?" and "In the past week (7 day period) how many meals have you had that included 1 serving of green vegetables?" Last, participants indicated their primary reason for exercising—"To receive long-term benefits (e.g., to be healthy)" or "To receive short-term benefits (e.g., to have fun)"—and their primary reason for eating green vegetables—"To receive long-term benefits (e.g., health benefits)" or "To receive short-term benefits (e.g., taste benefits)."

Results and Discussion

Another group of participants (see Study 1) confirmed our measures: The immediate reward (i.e., fun) for exercising was perceived as arriving sooner than the delayed reward (i.e., importance; $M_{immediate}$ = 1.31, SD = 1.33; $M_{delayed}$ = 2.51, SD = 1.54), $t(79) = 5.78$, $p < .001$, 95% CI = [0.79, 1.61], $d = 0.65$, and the immediate reward (i.e., taste) from eating green vegetables was perceived as arriving sooner than the delayed reward (i.e., health; $M_{immediate}$ = 1.36, SD = 1.18; $M_{delayed}$ = 3.04, SD = 1.74), $t(79) = 9.07$, $p < .001$, 95% CI = [1.31, 2.04], $d = 1.01$.

To test our main hypothesis, we first analyzed the results for exercising. We excluded responses three standard deviations above the mean (i.e., responses greater than 30.3 hr a week; $n = 3$) and participants who failed to complete the question ($n = 2$). We regressed total hours spent exercising (M = 4.86 hr, SD = 4.40) simultaneously on importance and fun ($r_{importance,fun} = .64$, $p < .001$). We find the predicted effect of immediate rewards on hours spent exercising during a week, $\beta = .30$, $SE = .14$, $t(77) = 2.09$, $p = .040$, 95% CI = [0.04, 1.69], whereas the effect of delayed rewards was not significant, $\beta = .02$, $SE = .14$, $t < 1$, $p = .897$, 95% CI = [−0.99, 1.13] (Figure 1).

Due to negative skew for delayed (skewness = −1.07) and immediate rewards (skewness = −.61), we conducted another analysis on the inverse square-root transformations of these variables. In this analysis, we also conducted a square-root transformation to account for positive skew for hours exercised (skewness = 2.78). We find a similar pattern of results in a regression analysis using these transformed variables; immediate rewards significantly predicted hours exercised during a week, $p = .046$, 95% CI = [−1.06, −0.01], whereas there was a nonsignificant effect of delayed rewards, $p = .473$, 95% CI = [−0.75, 0.35]. Levene's test for equality of variances was not significant, $F < 1$, implying similar variances for immediate and delayed rewards.

We move on to analyze the results for green vegetable consumption. We exclude responses three standard deviations above the mean (i.e., responses greater than 24.7 meals a week; $n = 1$) and participants who failed to complete the question ($n = 2$). We regressed total meals containing a serving of green vegetables (M = 7.82 meals, SD = 5.13) simultaneously on health and taste ($r_{health,taste} = .31$, $p = .005$). We find the predicted effect of immediate rewards, $\beta = .37$, $SE = .11$, $t(79) = 3.50$, $p < .001$, 95% CI = [0.57, 2.07], whereas the effect of delayed rewards was not significant, $\beta = .17$, $SE = .11$, $t(79) = 1.60$, $p = .114$, 95% CI = [−0.24, 2.18].

Due to a negative skew for delayed (skewness = −1.46) and immediate rewards (skewness = −.72), we again conducted another analysis on the inverse square-root transformations (total meals eaten was not skewed; skewness = .870). We find a similar pattern of results in a regression

analysis using transformed variables; immediate rewards significantly predicted green vegetable consumption, $p < .001$, 95% CI = [−7.09, −2.01], whereas we find a nonsignificant effect of delayed rewards, $p = .169$, 95% CI = [−5.90, 1.05]. Levene's test for equality of variances was significant ($SD_{immediate} = 0.43$; $SD_{delayed} = 0.31$, $F = 7.79$, $p = .01$).

Last, we examine participants' primary motivation for exercising and eating green vegetables. A significant majority (91.3%, $n = 73$; $z = 7.27$, $p < .001$, 95% CI = [0.84, 0.96]) of participants exercise to receive delayed rewards and a significant majority (82.9%, $n = 68$; $z = 5.85$, $p < .001$, 95% CI = [0.74, 0.90]) eat green vegetables to receive delayed rewards, confirming these are self-control behaviors people pursue for long-term outcomes."

This study provides evidence that immediate rewards can facilitate a pattern of continued engagement in healthy habits that extends over time, using more specific goals and measures than Study 1. We note that one limitation of our studies thus far is that we provided content to the immediate and delayed rewards. Specifically, the immediate rewards were intrinsic (e.g., enjoyment) and the delayed rewards were extrinsic (e.g., importance). Accordingly, in our last study we more strictly test for our theory by eliminating these contents.

Study 5: Effects of Anticipated Versus Materialized Rewards

The purpose of Study 5 was twofold. First, we measured immediate and delayed rewards more directly, without providing intrinsic (e.g., enjoyment) and extrinsic (e.g., important) contents to participants. Second, we examined whether the timing of reward measurement influences goal persistence. Specifically, in Studies 1 and 4 we measured materialized rewards post engagement, whereas in Studies 2 and 3 we measured anticipated rewards, prior to engagement. In Study 5, we accordingly manipulated the timing of evaluating rewards, to test whether anticipated and retrospective reports of rewards differ.

Specifically, we measured immediate and delayed rewards from eating carrots either before or after we assessed goal persistence (grams of carrots consumed). Whereas previous research has confirmed that people primarily eat carrots to receive delayed rewards (health benefits), rather than immediate rewards (taste benefits; Woolley & Fishbach, 2016), we expected that the presence of immediate rewards more strongly predicts consumption, regardless of whether the immediate rewards are anticipated (prior pursuit) or materialized (post pursuit).

Method

Participants. An experimenter invited 120 participants on a college campus to complete a short survey in return for a pen (65 females; $M_{age} = 27.98$, $SD = 12.88$).

Procedure. Participants took part in a snack study where they sampled food and answered questions. An experimenter gave participants a small bag of carrots (preweighed for one serving, 85g) and asked them to eat as many or as few carrots as they would like. We manipulated the order such that participants either sampled carrots and then filled out questions (materialized-rewards condition) or filled out questions and then sampled carrots (anticipated-rewards condition).

Participants answered questions mapping onto immediate rewards: "To what extent will eating the carrots be immediately rewarding" (0 = *will not be immediately rewarding*, 6 = *will definitely be immediately rewarding*) and "To what extent will eating the carrots make you feel good in the moment, while you eat them?" (0 = *will not make me feel good in the moment*, 6 = *will make me feel very good in the moment*). They also answered questions mapping onto delayed rewards: "To what extent will eating the carrots provide delayed rewards?" (0 = *will not provide delayed rewards*, 6 = *will definitely provide delayed rewards*) and "To what extent will eating the carrots make you feel good later, after you eat them?" (0 = *will not make me feel good later*, 6 = *will make me feel very good later*). After the study ended, we weighed the remaining carrots and calculated the total grams of carrots consumed.

Results and Discussion

We collapsed the two items measuring immediate rewards ($r = .82$, $p < .001$) and the two items measuring delayed rewards ($r = .52$, $p < .001$). To test the hypothesis, we regressed grams of carrots consumed ($M = 23.13$, $SD = 25.53$) simultaneously on order and immediate and delayed rewards from eating carrots ($r_{immediate,delayed} = .42$, $p < .001$). We find the predicted effect of immediate rewards, $\beta = .21$, $SE = .10$, $t(116) = 2.17$, $p = .032$, 95% CI = [0.34, 6.85], whereas the effect of delayed rewards was not significant, $\beta = .09$, $SE = .10$, $t < 1$ (Figure 1). We find no effect of order, $\beta = .03$, $SE = .09$, $t < 1$, or interactions with order, ts < 1. The variances for immediate rewards ($SD = 1.52$) and delayed rewards ($SD = 1.57$) were similar (Levene's test $F < 1$). This study provides support for our hypothesis that both anticipated and materialized immediate rewards predict persistence in long-term goals such as healthy eating.

Meta-Analysis

We conducted two random-effects meta-analyses to examine whether there was an overall pattern across Studies 1 to 5 that immediate rewards predict persistence in long-term goals more strongly than delayed rewards. We used standardized betas as predictors in the meta-analyses (Kim, 2011; Maaß, Lämmle, Bensch, & Ziegler, 2016). The R package metafor (Viechtbauer, 2010) was applied to specify a random-effects model for the nine regressions from Studies 1 to 5 and the pilot data that examined the relationship between immediate rewards versus delayed rewards and persistence

(Note: Study 4 and pilot Study 2 included two regression analyses: one for exercise and one for green vegetable consumption).

The Q statistics, $Q(8) = 5.16$, $p = .74$, and $Q(8) = 4.84$, $p = .77$, for the models with immediate rewards as the predictor and delayed rewards as the predictor, respectively, showed that there was no significant heterogeneity within the effects. The effect of immediate rewards on persistence, controlling for delayed rewards, was significant, $\beta = .35$, $SE = .04$, 95% CI = [0.28, 0.42], $p < .001$, as was the estimate for the effect of delayed rewards on persistence, controlling for immediate rewards, $\beta = .09$, $SE = .03$, 95% CI = [0.02, 0.16], $p = .009$.

Overall, we find immediate rewards are significantly stronger predictors of persistence in long-term goals than delayed rewards, $p < .001$, as their 99.9% CIs do not overlap (immediate 99.9% CI = [0.23, 0.47]; delayed 99.9% CI = [−0.02, 0.20]). Across our individual studies, immediate rewards significantly predict persistence in long-term goals, whereas delayed rewards do not, although these studies themselves do not demonstrate a difference between immediate and delayed rewards (see Gelman & Stern, 2006). However, the meta-analyses allow us to test whether immediate rewards do indeed predict persistence to a greater extent than delayed rewards, which we find evidence for. In this analysis, we further find that delayed rewards do predict persistence, although not as strongly and not our main prediction.

General Discussion

Five studies provide evidence that immediate rewards more strongly predict persistence in long-term goals than delayed rewards. Specifically, in Study 1, people reported being more successful at pursuing their New Year's resolution when their resolution provided immediate rewards; in Study 2, the presence of immediate rewards predicted persistence studying; in Study 3, gym-goers' valuation of immediate rewards predicted persistence in a cardio workout; in Study 4, immediate rewards predicted weekly exercising over the course of 3 months and healthy eating over a week; and in Study 5 both anticipated and experienced immediate rewards predicted healthy food consumption. By comparison, in each of these studies, the presence of delayed rewards did not significantly predict persistence; only in a meta-analysis of all studies did it predict persistence. In addition, our meta-analysis finds that the presence of immediate rewards predicted persistence more than the presence of delayed rewards.

Alternatively, one could argue that participants in our studies are in agreement on how important goal activities are (e.g., healthy eating, studying, exercising), but that there is greater fluctuation in how much enjoyment these activities provide, which is driving the effect. Importantly, in the majority of our studies we do not find a significant difference in variance between immediate and delayed rewards, suggesting that our results are not driven by greater variance (i.e., lower agreement) in evaluating the presence of immediate rewards for pursuing long-term goals. Moreover, we find that the presence of delayed rewards predicts expectations for engaging in the behavior in the future (Study 1), or over a typical week (Study 3), indicating delayed rewards have sufficient variance.

However, it is possible that in some studies those who report or value having a positive experience choose different tasks or workouts than those who did not have or value a positive experience. Against this argument, we note that in Studies 2 and 3 we explore specific behaviors and do not find that participants compromise delayed rewards to achieve immediate rewards. For example, the exercises selected by those who valued having an enjoyable exercise were no less vigorous than exercises selected by those who did not emphasize having an enjoyable exercise. In addition, Studies 4 and 5 assessed healthy food consumption, which is a very specific consumption activity with less room for variance in vigorousness or in the provision of delayed rewards. This adds support to our hypothesis that the presence of immediate rewards is beneficial for persisting in long-term goals, above the presence of delayed rewards.

Implications

Previous research suggested immediate rewards might matter for long-term pursuits, for example, interest motivates students' academic goal pursuit in general (Harackiewicz, Smith, & Priniski, 2016; Sansone & Thoman, 2005) and enrollment in math courses in particular (Meece, Wigfield, & Eccles, 1990; Wigfield & Eccles, 2000). This work in the academic domain is generally consistent with our findings, although our work further expands to other goal domains (e.g., exercise and healthy eating), measures of immediate rewards, and more importantly, to systematically compare the effect of immediate versus delayed rewards.

However, our work may seem inconsistent with the self-control literature. Research on self-control focuses on the attention and valuation of delayed rewards in overcoming immediate temptation (Fishbach & Trope, 2005; Fujita, Trope, Liberman, & Levin-Sagi, 2006; Metcalf & Mischel, 1999; Mischel et al., 1989). Because a self-control dilemma represents a conflict between long-term goals and immediate temptation, it seems logical that attention to delayed outcomes that favor the goal will motivate activity pursuit. For example, the student who debates between partying and studying will be more likely to study if she considers the delayed rewards of studying (getting a degree) or partying (none, most likely) than if she considers the immediate rewards of studying (effort, boredom) or partying (fun).

But whereas self-control dilemmas trade off immediate and delayed rewards, we note that many activities people pursue to receive delayed rewards also contain immediate rewards. For example, our student may find some of the topics she studies interesting. Alternatively, she may feel proud in the moment (an immediate reward for sticking with her

studying plans). The presence and valuation of these immediate rewards of long-terms goals are critical, as they have a strong influence on goal persistence. Not only do students study to graduate, or gym-goers exercise to be healthier; but people also pursue these activities for the immediate rewards they offer. A modified perspective of self-control operations needs to take this possibility into account.

One implication from this research is that people can bypass the need to exert self-control to persist in a long-term goal, to the extent that they receive immediate rewards when pursuing their goal. That is, although the presence of delayed rewards may be useful for initiating goal-directed behavior, immediate rewards more strongly predict persistence in the activity. In this way, having a positive experience when pursuing a goal can assist goal pursuit by facilitating persistence without the need to exercise self-control.

In addition, this work has implications for how people can best motivate themselves and others to pursue long-term goals. People can select into situations that facilitate long-term goals, and then pursue activities that provide immediate rewards. For example, a person can plan to go to the gym, and once there select a workout that she finds enjoyable. Similarly, a person can modify the situation to facilitate goal pursuit by bringing in immediate rewards to improve the experience of the activity. For example, a person can listen to music while exercising to increase the immediate rewards received from working out. In this way, she can facilitate persistence in her long-term goal. Maximizing the presence of immediate rewards when pursuing long-term goals, rather than relying on the importance of the goal to carry her through, should increase goal persistence.

The results of Study 1 provide some evidence that people may not be aware of the role immediate rewards play in influencing their goal persistence. In this study, people's current goal pursuit is predicted only by the presence of immediate rewards and not delayed rewards. However, people expect both immediate and delayed rewards to predict their future pursuit. If people are not aware of the role immediate rewards play in influencing goal persistence, they may select activities that maximize delayed rewards without considering whether the activities also contain immediate rewards. The current work suggests that neglecting immediate rewards when pursuing long-term goals is a mistake, as immediate rewards are strongly associated with persistence in these goal activities. Indeed, even though we find people primarily pursue long-term goals to receive delayed rewards, during pursuit, delayed rewards appear to matter less for persistence.

Future Directions

In the current article, we focus on the presence of immediate and delayed rewards for predicting persistence in long-term goals. One open question, however, is how individual differences interact with immediate and delayed rewards in predicting long-term goal pursuit. Previous research has identified a number of individual differences associated with goal persistence, which may moderate the role of immediate rewards on increasing persistence in long-term goals (e.g., self-efficacy, Bandura, 1977; optimistic explanatory style, Seligman & Schulman, 1986; locus of control, Rotter, 1966; levels of pride, Pekrun, Elliot, & Maier, 2009; Sigall & Gould, 1977; Williams & DeSteno, 2008; grit, Duckworth, Peterson, Matthews, & Kelly, 2007). For example, immediate rewards may matter less for those who score higher on grit, as grit involves maintaining effort in pursuit of a goal over a significant amount of time, despite facing setbacks or a lack of progress (Duckworth et al., 2007). One possibility is that the presence of immediate rewards does not predict persistence as strongly for gritty individuals who exhibit continued activity pursuit in the absence of a positive experience.

Future research can further examine the relationship between immediate and delayed rewards for predicting performance or achievement of specific goals, such as grade point average (GPA), race time, or amount of weight lost. If it is the case that immediate rewards are a better predictor of persistence in long-term goals than are delayed rewards, they may also predict improved performance on these goals over time.

Concluding Remark

Although pursuit of long-term goals is primarily motivated by the desire to receive delayed rewards, we find that immediate rewards are a stronger predictor of persistence in goal-related activities. Thus people are more successful at pursuing their resolutions, persist longer studying and exercising, continue engaging in healthy habits over time, and eat more of a healthy food to the extent that immediate rewards are available when pursuing these activities. To motivate adherence to long-term goals, people can therefore engage in activities that offer both immediate and delayed rewards during pursuit.

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Supplemental Material

The online supplemental material is available at http://pspb.sagepub.com/supplemental.

Notes

1. Before running Study 1, we conducted a pilot study in January 2016 on 101 Amazon Mechanical Turk (Mturk) workers who indicated setting a resolution (see the online appendix).
2. Before running Study 4, we conducted a pilot study with 120 visitors at a museum (see the online appendix).

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