Organizational Behavior and Human Decision Processes 167 (2021) 101–113

Contents lists available at ScienceDirect

Organizational Behavior and Human Decision Processes

journal homepage: www.elsevier.com/locate/obhdp

The divergent impact of reward magnitude on goal eagerness and effort investment

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ARTICLE INFO

Keywords:
Motivation
Eagerness
Effort investment
Reward
Self-regulation

ABSTRACT

When attempting to motivate an individual, does increasing the magnitude of the reward always have a positive impact on one's effort investment? Through six experiments, we demonstrate that although individuals working for a large (vs. small) reward are more eager to commence the task (Studies 1–5) and more likely to persist when encountering an opportunity to terminate the pursuit (Study 2), the intensity of their effort investment in the goal remains relatively unchanged regardless of the magnitude of the reward (Studies 1–5). The insensitivity of effort investment to the magnitude of the reward disappears in the following contexts: when the participants are reminded of the reward size during the goal striving phase (Study 3), when individuals make a plan prior to commencing the task (Study 4), and when a partial reward is allocated to each goal-directed action (Study 5). This divergent impact appears because the psychological processes and information that govern pre-initiation goal eagerness may differ from those that control post-initiation effort investment.

1. Introduction

Will offering a hefty reward always motivate employees to take on a challenging task and expend more effort to complete the task? Although it is reasonable to assume that individuals exert more effort when the reward is attractive (Heath, 1999; Rusbult & Farrell, 1983; Vroom, 1964), whether individuals respond to rewards uniformly throughout the task remains unknown. Though employees may quickly dive into a task when they are promised a large payoff, is it possible that the actual effort they expend to complete the task may not increase accordingly? If this is the case, are managers wasting money by attempting to motivate their employees to perform better by offering greater rewards?

How to best motivate people has long been a central question in both social psychology and industrial and organizational psychology (Kruglanski, 1996; Neal, Ballard, & Vancouver, 2017). When examining motivation, an implicit but common assumption is that motivation should be largely consistent at different goal processes (e.g., Atkinson, 1957) such that when a specific factor (e.g., the reward size) is found to impact a person's motivation, it is expected that all indicators of motivation should show consistent movement. For instance, if one believes that offering individuals a substantial reward can enhance their motivation, this change should be captured by various indicators, such as how soon people commence the task (Esqueda, 1985; Hannah & Neal, 2014), how intensely they engage in repeated goal-directed actions (Earley, 1985), and how persistent they are in performing the task (Grant, 2008).

However, given the variety of measurements of motivation and the different time points at which such measurements are performed, it is possible that motivation as a construct may not be monolithic. Indeed, some recent work has suggested that the degree of motivation may diverge at different stages of goal pursuits. For example, Vancouver, More, and Yoder (2008) distinguished between the choice of whether to pursue a goal and, if chosen, the planned effort one is willing to exert for the pursuit and showed that as goal expectancy increases, individuals are more willing to pursue the goal, but they allocate less effort to seeking the goal.

In this research, we aim to answer the following intriguing question that highlights this important divergence: does individuals' motivation respond to changes in external incentives (i.e., reward) in the same way when measured at different goal stages? Specifically, we focus on two critical aspects of motivation, namely, eagerness to initiate prior to the pursuit (i.e., how quickly a person adopts a goal and initiates goal-directed actions) and the intensity of the effort investment during the pursuit (i.e., how much effort one exerts in performing goal-directed

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https://doi.org/10.1016/j.obhdp.2021.08.004
Received 16 January 2020; Received in revised form 29 July 2021; Accepted 20 August 2021
Available online 27 August 2021

actions during a given period). Although both conventional wisdom and empirical evidence suggest that motivation should increase as the magnitude of the reward increases (Cameron & Pierce, 1994; Pessiglione et al., 2007; Roesch & Olson, 2004), we propose that although an increase in the reward size has a positive impact on an individual's eagerness to initiate goal-directed actions, it does not have a similarly positive impact on the actual effort people invest once the pursuit begins. This divergent impact exists because the psychological processes and the information that govern pre-initiation goal eagerness differ from those that control post-initiation effort investment. In the following section, we provide the theoretical background and rationales of our proposed hypothesis.

2. Theoretical background

2.1. Distinctions between goal eagerness and effort investment

Motivation in the pursuit of a goal depends on several properties, such as the value, difficulty, and specificity of the goal (Austin & Vancouver, 1996; Diefendorff & Chandler, 2011). Importantly, the completion of goals also involves different processes, including goal choice, goal planning, and goal striving (Neal et al., 2017; Sun et al., 2014; Vancouver, Weinhardt, & Schmidt, 2010). For example, the goal choice process determines the goals that individuals strive to achieve (Klein, Austin, & Cooper, 2008), and goal-planning determines the strategy that individuals use to pursue their goal and how they allocate the necessary resources to ensure its attainment (Vancouver et al., 2008). To reflect the different goals and courses that individuals follow, researchers have adopted various responses to capture motivation, including cognitive (Förster, Liberman, & Higgins, 2005; Zeigarnik, 1927), affective (e.g., Elliot & Harackiewicz, 1996; Ryan, 1982), and behavioral (e.g., Aspinwall & Richter, 1999) responses.

The different measures that researchers have used to capture the fluctuations in motivation imply that motivation may be regulated by different processes at different points during the pursuit (Fishbach & Choi, 2012; Gollwitzer, 1999; Vancouver et al., 2010). For example, in simple and repeated tasks that resemble automatic responses (e.g., a transcription job; Huang, Jin, & Zhang, 2017), the speed at which a person begins to act (e.g., how much time elapses before the person performs the first goal-directed action, Esqueda, 1985; Zhang & Huang, 2010) might capture the motivational eagerness to pursue the goal. However, the number of goal-directed actions completed during a specific period (e.g., Higgins & Trope, 1990; Koo & Fishbach, 2008; Vansteenkiste & Deci, 2003) may reflect the effort investment.

The choice and completion of a goal represent a multi-process endeavor (Brandstätter et al., 2001; Fishbach & Choi, 2012; Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997; Neal et al., 2017; Vancouver et al., 2010). On the one hand, one must assess the desirability and feasibility of the goal and deliberate whether and how to initiate or terminate goal-directed actions (Barron & Harackiewicz, 2001; Schnelle, Brandstätter, & Knöpfel, 2010; Sun et al., 2014). On the other hand, individuals may repeatedly perform goal-directed actions and maintain movement toward completion (Shah & Kruglanski, 2003). For example, a student may first evaluate all conditions to determine whether to study for an upcoming exam and, once decided, invest effort to study.

Although both increased eagerness and effort indicate greater motivational strength, critical distinctions exist between these two aspects of this construct. We define goal eagerness as one's momentary willingness to commit to pursuing a goal and change one's behavioral state to initiate the first action toward goal completion. Behaviorally, goal eagerness is captured by how quickly one commits to a goal and transitions from a state of not pursuing the goal to a state of executing goal-directed actions. In comparison, the intensity of effort investment refers to the amount of effort that one actually exerts in executing goal-directed actions during a given period. This aspect of motivation is behaviorally captured by the number of goal-directed activities, particularly repeated, low-level actions, that one completes. Though goal eagerness reflects one's momentary desire to complete the goal and the ensuing changes in behaviors, the intensity of the effort investment reflects the level of resources that one mobilizes to maintain controlled movements toward the end point.

2.2. Eagerness and effort intensity at different goal processes

This critical difference between goal eagerness and effort investment reflects the distinctive processes in goal pursuit. For example, in the Action Phases Model (e.g., Brandstätter et al., 2001; Gollwitzer, 1990, 1999; Gollwitzer & Brandstätter, 1997), goal pursuit is separated into the pre-action phase and the action phase. Fishbach and Choi (2012) echoed these distinctions by showing that the course of pursuing a goal includes "intending to initiate an activity" and "pursuing the activity beyond initiation." In the industrial and organizational psychology literature, the influential conceptualization of goal choice versus goal striving (Neal et al., 2017; Vancouver et al., 2008; Vancouver et al., 2010) reflects a similar distinction. The process of goal pursuit is conceptualized as involving both goal choice and goal striving (Austin & Vancouver, 1996). In this framework, goal choice refers to the process of selecting a goal to pursue based on expectancy, such as the anticipated reward. Once goals are established and individuals initiate the pursuit, they proceed to the goal striving stage and mobilize efforts to carry out goal-directed activities toward goal completion (Vancouver & Putka, 2000).

The extant literature highlights the critical distinctions between the pre-initiation goal choice and post-initiation goal striving phases. The pre-initiation goal choice phase primarily consists of answering the questions of whether and how to proceed and is regulated by an assessment process (Avnet & Higgins, 2003; Gollwitzer, 1990) focusing on evaluating the properties of the goal (Ajzen, 1991; Locke & Latham, 1990; Vroom, 1964). The resolution of this assessment reflects one's choice and intention at a particular moment and is best manifested through one's momentary propensity to begin carrying out goal-directed actions (i.e., goal eagerness). In comparison, once individuals initiate the goal, they focus on performing specific goal-directed actions, which is known as the goal-striving phase in the control theory-based model (Vancouver, 2005; Vancouver & Putka, 2000). The completion of such goal-directed actions heavily depends on the experience of completion (Fishbach & Choi, 2012; Vancouver & Putka, 2000) rather than an assessment of the goal properties. Although it is typical that different goal processes are involved in different stages of a goal pursuit, one might also see different goal processes within a stage. For example, during goal striving, the goal choice process may kick in to cut off the goal-striving process prior to reaching the goal (Vancouver & Purl, 2017).

The distinctive nature of the two regulatory processes stipulates that the motivation at different goal stages may display different patterns as the properties of the goal change. In this research, we focus on the following important goal property that is frequently employed in practice: the magnitude of the reward associated with goal attainment. We suggest that although individuals' goal eagerness increases as the magnitude of the reward increases, the intensity of their effort investment should remain largely insensitive to such changes in the reward magnitude.

2.3. Impact of the reward magnitude

During the intention phase, individuals' action propensity, including the goal choice process, largely relies on an assessment of the situation and the various available alternatives. Goal theorists have generally agreed that during this goal choice process (Vancouver et al., 2008), incentives or other sources of value should increase the probability that individuals adopt or select a goal (Riedel, Nebeker, & Cooper, 1988; Sun

et al., 2014). At this point, the benefits of goal attainment (i.e., anticipated reward) are among the most critical factors (Locke & Latham, 1990; Vroom, 1964) and exert a significant influence on the choice of the goal and the formation of goal intentions (Oettingen, 2000; Oettingen et al., 2001). Greater benefits associated with goal attainment increase the instrumentality of an activity, which promotes quicker goal choice and stronger intentions. Once formed, such strong intentions have a direct impact on people such that they translate the intentions into actions (Brandstätter et al., 2001; Gollwitzer, 1993). Previous findings suggest that people deliberate faster when incentives are higher because a higher incentive increases the utility to a threshold that triggers the stop-thinking-and-pick rule more quickly (Busemeyer & Townsend, 1993). Therefore, when people anticipate that a greater reward is associated with goal attainment, their intention becomes stronger, leading to a swifter transition into the action phase. For example, compared with offering a small reward (e.g., $1) for completing a transcription task, offering a larger reward (e.g., $5) for the same task should lead to greater eagerness to commence the task because the larger reward enhances the strength of the goal intentions and facilitates the transition to the action phase.

Are individuals' actual efforts invested in the goal striving phase similarly affected by changes in the reward magnitude? To the dismay of managers who wish to motivate their employees using higher rewards, the answer may be disappointing. Once individuals adopt a goal and start performing goal-directed actions, the reward associated with goal completion becomes less relevant for the execution of actions, and importantly, their psychological resources are no longer regulated by the assessment process but instead by the locomotion process (Avnet & Higgins, 2003). The locomotion process includes the aspects of self-regulation concerned with progressing from the current state to a new state (i.e., movement). As goal striving requires only the completion of the specific goal-directed actions at hand, the value of the ultimate reward becomes irrelevant for the execution of actions (Vancouver & Purl, 2017; Vancouver et al., 2010), and during this process, individuals lower their psychological construal of the goal (Fujita et al., 2006) and become less sensitive to the reward.

A critical characteristic of the goal striving phase during which individuals conduct goal-directed actions is that execution is more automatic, particularly the execution of repeated low-level actions (Aarts & Dijksterhuis, 2000; Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009). Therefore, the actual efforts that individuals invest in performing low-level actions depend almost exclusively on the specific action and the momentary feedback they receive. For example, considering a group of employees who need to work on a transcription task to obtain a reward, their decision regarding whether to complete the task and how eager they are to initiate the task may change when the size of the reward increases from $10 to $50. However, once they initiate the task, they focus almost exclusively on the execution of specific actions (i.e., typing the text), and their rate of typing depends almost solely on the experience of typing rather than the size of the reward.

Notably, although our theory highlights the distinction between goal eagerness and effort investment, both variables are important aspects of motivation and are echoed by extensive literature in social (Fishbach & Choi, 2012; Higgins & Trope, 1990; Koo & Fishbach, 2008) and industrial and organizational (Neal et al., 2017; Sun et al., 2014; Vancouver et al., 2010) psychology. A critical contribution that we aim to make is highlighting that at different time points, motivation is regulated by different psychological processes and controlled by different information. As the properties of the overarching goal carry different weights in different goal stages, the same reward may produce different motivational outcomes when measured at different times. Next, we report six studies involving real rewards and real behavioral measures performed to test the hypothesized divergent impacts of the reward magnitude on individuals' eagerness and effort intensity. The experimental materials and data of each study are available on the open science framework (https://osf.io/qb39k/).

3. Study 1A

In Study 1A, the participants completed an arithmetic task to win a large ($15) or a small ($1.50) reward. The participants encountered a loading page before commencing the task. We recorded how long the participants waited before asking the experimenter for help as a measure of their goal eagerness, and their actual performance was assessed as a measure of effort intensity.

3.1. Methods

3.1.1. Participants and design

In exchange for monetary rewards, 184 undergraduates (63.0% female, $M_{age} = 19.25$, $SD = 1.79$) from a large public university participated in this study. An a priori power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) suggested that 64 participants per condition would be required to achieve an adequate power of 0.80 at the α level of 0.05, two-tailed, to detect a between-subjects effect assuming a medium effect size ($d = 0.50$). We targeted a minimum sample of 128 participants and attempted to recruit as many participants as possible during the predetermined experiment period. No participants were excluded in this study. We report the data exclusions and measures of all studies. The study adopted a 2-cell (reward magnitude: small vs. large) between-subjects design, and we measured two aspects of motivation (eagerness vs. effort intensity) per participant.

3.1.2. Procedures

The participants were recruited to complete a series of tasks in which we asked them to find two numbers whose sum is 10 (Mazar, Amir, & Ariely, 2008; Mead, Baumeister, Gino, Schweitzer, & Ariely, 2009; see the Appendix for an illustration) on desktop computers in separate cubicles. The cover story informed the participants that the experimenters were interested in college students' arithmetic skills and that their task was to find two numbers in a 3 × 3 matrix whose sum is 10. The instructions further informed the participants that they needed to solve as many matrices as possible within three minutes and that the computers would track the number of matrices they solved correctly, which would constitute their performance score in the task. We chose the adding-to-10 task because even though it appears as a test of arithmetic skills, it requires limited skill. If the participants were motivated to perform well, they could always solve the problem and clearly identify whether their answers were correct (Mazar et al., 2008). Given this property of the task, the number of problems the participants successfully solved could serve as a good indicator of their effort intensity in the task.

We manipulated the reward magnitude by varying the size of the reward that the participants could receive for outperforming the other participants. Specifically, the participants were told that they would have a chance to receive a cash reward if they outperformed 50% of the other participants in the task. The participants under the large-reward condition were informed that the reward was 100 RMB (approximately $15), and those under the small-reward condition were told that the reward was 10 RMB (approximately $1.50).

After reading the instructions, the participants commenced the task. The program launched a loading page and explained the following: "The program is now loading, and it may take a while. In the case the loading takes too long, you may press 'Shift + F' to notify the system administrator for help." We recorded the amount of time the participants waited (in seconds) before notifying the administrator as a measure of their eagerness to commence the task.

To ensure that all participants waited the same amount of time before actually commencing the task, once the participants pressed the key combo ("Shift + F") to notify the system administrator, the page reloaded. The amount of time the page required to reload and show the question page depended on when the participant pressed the key combo; thus, all participants waited 120 s in total before viewing the questions. For the participants who did not press the key combo, the program

automatically started after 120 s.

After completing the 3-minute task, all participants were asked to answer a set of sign-off questions, including 1) "To what extent did you think that the task was difficult?" (1 = extremely easy, 7 = extremely difficult), and 2) "To what extent did you think that the task was interesting?" (1 = extremely boring, 7 = extremely interesting). Then, the participants were debriefed, compensated, and dismissed. All participants were paid the promised compensation plus a bonus reward regardless of their performance.

3.2. Results and discussion

We used different measures to capture the participants' goal eagerness (i.e., the amount of time the participants waited before notifying the system administrator) and effort intensity (i.e., the number of solutions they provided within 3 min). We analyzed these two dependent variables separately and compared each variable between the small- and large-reward conditions. The results revealed that the participants under the large-reward condition waited for a shorter time before calling the administrator (M = 75.99 s, SD = 36.74) than those under the small-reward condition (M = 88.39 s, SD = 40.26; $F(1, 182) = 4.75$, $p = .031$, $\eta^2 = 0.025$), indicating that a larger reward elicited greater goal eagerness. As the waiting time was censored due to the time limit (i.e., the longest waiting time was 120 s), an appropriate method of analyzing such time-to-event data is a survival analysis (Hoelzl & Loewenstein, 2005). Thus, we conducted a log-rank test of equality of the survival functions (Kaplan–Meier) of eagerness as a robustness check. The difference across the conditions remained significant, $\chi^2(1) = 4.79$, $p = .029$. However, the number of problems the participants solved within three minutes (including the incorrect answers) did not differ between the two conditions (M_{large} = 11.42 questions, SD = 4.51 vs. M_{small} = 11.57 questions, SD = 4.87; $F(1, 182) = 0.05$, $p = .826$, $\eta^2 < 0.001$), indicating that the effort intensity was not influenced by the reward magnitude. The results still held after excluding the incorrect answers (incorrect rate = 5.4%; M_{large} = 10.44 questions, SD = 3.70 vs. M_{small} = 11.01 questions, SD = 4.91; $F(1, 182) = 0.78$, $p = .379$, $\eta^2 = 0.004$).

Additionally, we found that neither the perceived task difficulty nor interest in the task differed between the small- and large-reward conditions (perceived difficulty: $M_{small} = 3.91$, $SD = 1.30$ vs. $M_{large} = 3.91$, $SD = 1.14$; $F(1, 182) < 0.01$, $p = .983$, $\eta^2 < 0.001$; perceived interest: $M_{small} = 4.33$, $SD = 1.54$ vs. $M_{large} = 4.17$, $SD = 1.46$; $F(1, 182) = 0.54$, $p = .462$, $\eta^2 = 0.003$), suggesting that expecting a larger (vs. a smaller) reward did not alter the participants' experiences during the task.

Study 1 provided initial evidence supporting our hypothesis that the reward magnitude exerts an impact on goal eagerness but not on effort investment. This result provides an important caveat to the conventional wisdom that an individual's motivation increases as the magnitude of the reward increases. Instead, we found that not all aspects of motivation are sensitive to the magnitude of the reward. Compared with goal eagerness, people's effort intensity seems to be much less susceptible to the influence of the reward size.

Although this study provides evidence supportive of our hypothesis, Study 1A assessed eagerness and effort intensity in a relatively easy task within a very short time limit, which might cause a null effect of effort intensity. Study 1B used a more difficult task that was sensitive to goal-gradient effects (e.g., Förster, Higgins, & Idson, 1998; Kivetz, Urminsky, & Zheng, 2006) and extended the goal pursuit timeframe to examine whether the observed effect held when the goal was more long-term and interruptions by other goals were common.

4. Study 1B

In Study 1B, the participants completed a one-week task to win a large ($15) or a small ($1.50) reward. The participants were allowed to join the task earlier or later within the given period. We recorded how long they waited before starting the task as a measure of their goal eagerness, and their actual performance was assessed as a measure of effort intensity.

4.1. Methods

4.1.1. Participants and design

Three days before the study, we launched a registration survey on the website of a large public university to recruit participants to join a one-week task in exchange for monetary compensation. An a priori power analysis using G*Power (Faul et al., 2009) suggested that 64 participants per condition would be required to achieve an adequate power of 0.80 at an α level of 0.05, two-tailed, to detect a between-subjects effect assuming a medium effect size (d = 0.50). The study adopted a 2-cell (reward magnitude: small vs. large) between-subjects design, and we measured two aspects of motivation (eagerness vs. effort intensity) per participant. Given our design and the traditionally low completion rate of long-term goals (Capizzi Michael & Ferguson, 2005; Xu, Jin, & Zhang, 2019), we targeted a minimum sample of 128 participants and attempted to recruit up to 300 participants at the registration stage because we assumed that not all participants would commence and complete the task. We terminated the recruitment phase once the number of registered participants exceeded 300. Seventy-five participants did not return after registration and, therefore, were excluded from the analyses. [1]The nonresponse rate did not differ between the reward conditions (23.1% $_{small}$ vs. 26.8% $_{large}$, $\chi^2 = 0.54$, $p = .463$). The remaining 225 participants (58.2% female, M_{age} = 23.80, SD = 6.02) commenced the formal task and completed at least one required action. We preregistered our data collection and analysis plan at OSF (https://osf.io/8by5m).

4.1.2. Procedures

On the registration survey, the study was described as a product information collection job in collaboration with an online crowdsourcing company. The job required registered workers to use their smartphones for typing, photographing, and uploading information regarding the personal products that they were currently using. The task would last for one week during which the participants could choose any three consecutive days to collect and upload product information. Those providing information regarding at least three products would receive a 10 RMB (approximately $1.50) participation fee plus a chance to win an additional bonus based on their performance. If the participants agreed to participate, we asked them to provide their contact and demographic information. We further informed the registered participants that if they outperformed half of the participants, they would have a chance to win the additional bonus, and we manipulated the reward magnitude (10 RMB vs. 100 RMB). This requirement was intended to motivate the participants to exert their best effort without providing a specific criterion or target to prevent them from stopping once they reached the target.

The task began at midnight on Monday. Six hours before the start of the task, we sent via text messages to all registered participants the instructions for the task and a link to upload. The participants were allowed to commence the task at any time before the fifth day of the following week to ensure that each participant had three consecutive days to complete the task. [2]To assess eagerness, we measured the

[1] As a robustness check, we also conducted an analysis of eagerness by including these 75 participants. Specifically, we coded the excluded 75 participants' eagerness as the highest value (i.e., 120 h) and submitted all samples (N = 300) to a survival analysis. The log-rank test of equality of the survival functions of eagerness remained significant, $\chi^2(1) = 4.89$, $p = .027$.

[2] Only one participant joined the formal task after the fifth day. Excluding this participant's response did not change the pattern or significance of the results. Then, we included all participants in the following analyses.

amount of time before the participants uploaded their first product information (Kivetz et al., 2006).

In the formal task, the participants logged into the website using their phone number as their password to upload product information. Each login only allowed one upload. If the participants wanted to upload information regarding another product, they had to submit the previous information and log in again. To provide the information of one product, the participants were required to type in the product category (e.g., cookies or battery), brand name, and expiration date and upload a picture containing the barcode. The participants were also informed that all submitted information regarding the products would be evaluated by the crowdsourcing company and that only uploads including the above complete product information would be considered.

We further explained that due to the system storage limit, each participant could upload the information of a maximum of five products per day and that only submissions within three days of their first upload would be considered.[3] We designed these rules to encourage participation over multiple days and examined whether the participants were willing to follow this repetitive procedure to receive a larger reward. As a measure of effort intensity, we recorded how many submissions the participants uploaded in total over three consecutive days with more products indicating greater effort investment.

One week after the task ended, all participants were paid the promised compensation plus the bonus reward if they met the predetermined criteria. Then, all participants were thoroughly debriefed.

4.2. Results and discussion

We analyzed the participants' goal eagerness (i.e., the amount of time before the participants' first submission) and effort intensity (i.e., the number of products they submitted in total during the 3-day period) separately and compared each variable between the small- and large-reward conditions. The results revealed that the participants under the large-reward condition waited for a shorter time before making their first submission ($M = 16.58$ h, $SD = 23.79$) than those under the small-reward condition ($M = 22.79$ h, $SD = 13.40$; $F(1, 223) = 4.81$, $p = .035$, $\eta^2 = 0.020$), indicating that a larger reward elicited greater goal eagerness. The results still held after including the 75 participants who did not return after registration (eagerness coded as 120 h).

On average, the participants upload 5.49 products. To examine whether the participants uploaded more products as they approached the end (i.e., a goal-gradient effect), we constructed a GEE model of the number of uploads per day per participant including the reward magnitude (-1 = small reward, 1 = large reward, between-subjects manipulation), goal distance (1–7 days, repeated measure) and interaction term as predictors. Only the effect of goal distance was positively significant, $B = 0.199$, Wald $\chi^2 = 8.17$, $p = .004$, confirming the goal-gradient effect (Kivetz et al., 2006). However, the number of products that the participants submitted did not differ between the two conditions ($M_{large} = 5.75$ products, $SD = 5.09$ vs. $M_{small} = 5.24$ products, $SD = 5.18$; $F(1, 223) = 0.56$, $p = .456$, $\eta^2 = 0.002$), indicating that the total effort investment was not influenced by the reward magnitude. The results still held after excluding the uploads submitted outside the 3-day period (code uploads of more than 15 products as 15, the maximum performance based on the job rules) ($M_{large} = 5.64$ products, $SD = 4.78$ vs. $M_{small} = 5.00$ products, $SD = 4.55$; $F(1, 223) = 1.04$, $p = .309$, $\eta^2 = 0.005$).

[3] Eight participants continued to upload product information after three days since their first upload. Although this pattern violated the task rules, these participants provided information regarding more than 15 products in total. Coding their performance as the original or only 15 products (the maximum value according to the task rules) did not change the pattern or significance of the results. Then, we obtained the results using both the original and recoded values (i.e., 15) in the following analyses.

By using a more difficult task and extending the goal timeframe to a longer period, Study 1B again demonstrated that the reward magnitude positively impacts eagerness but has a much less significant impact on effort, ruling out the possibility that the null effect on effort investment may be explained by the ease of the task or the timeframe of goal pursuit.

Based on our theorizing, goal eagerness is more susceptible to the reward magnitude because it is mainly regulated by the assessment process and is more likely to be determined by the desirability of the goal. Therefore, when people are in the assessment and deliberation stages, their motivation should be more consistent with the reward magnitude even after they initiated their pursuit of the goal. For example, in goal striving, once people's performance of goal-directed actions is interrupted and they face an opportunity to terminate the pursuit, the assessment process should return to regulating the decision, and reward becomes relevant again. This centrality of the assessment process renders the decision to persist more similar to goal initiation than continuation (i.e., making people switch from goal striving to goal choice). Therefore, they would be susceptible to the influence of the reward magnitude. Our next study tests this hypothesis.

5. Study 2

The purpose of Study 2 was two-folded. First, this study explored how individuals' decision to persist with or terminate goal-directed actions (i.e., abandoning the pursuit) would be influenced by the reward magnitude. We predicted that, similar to goal eagerness, individuals' willingness to terminate the pursuit would display a high degree of susceptibility to changes in the reward magnitude because this decision heavily relies on one's critical evaluation of the goal achievement and thus is directly associated with the expected value of the reward once attained. Therefore, increasing the reward magnitude should result in greater eagerness to commence and lower willingness to terminate the pursuit when encountering a decision regarding whether to terminate the pursuit but has no significant impact on the intensity of effort investment during goal striving.

The second purpose of this study is to examine whether the effect holds beyond monetary rewards. In our conceptualization, the theoretical construct underlying the reward magnitude is the benefit associated with goal attainment (i.e., goal value). Therefore, the reward may be monetary or another stimulus that carries a significant incentivizing value, such as self-image and social approval (Dugar, 2010). Study 2 tested this hypothesis using a non-monetary reward.

5.1. Methods

5.1.1. Participants and design

In total, 194 participants (49.5% females, $M_{age} = 29.94$, $SD = 11.98$) were recruited from Amazon Mechanism Turk to perform a code recognition task. Similar to Study 1A, we targeted a minimum sample of 128 participants and established 200 HITs. The study adopted a 2 (reward magnitude: small vs. large) between-subjects design, and we measured three aspects of motivation (eagerness vs. effort intensity vs. willingness to terminate the pursuit) per participant. The reward magnitude was manipulated as a between-subjects factor, and the other motivation aspects were measured repeatedly. We preregistered our data collection and analysis plan at OSF(https://osf.io/hzp7f).

5.1.2. Procedures

The cover story presented to the participants was that they were recruited to perform a code recognition task in which they needed to visually recognize and convert the assigned "gotcha code" (the barely recognizable verification code in a distorted format that people are often asked to enter when signing into online accounts) into text within a given time. The task included two rounds with two minutes per round. If the participants correctly converted 20 or more lines of code, they could earn a $0.50 participation fee, which was the same for all participants.

After the participants agreed to participate and signed the consent form, we informed them that "As the preparatory work of a research program, this 'gotcha code' recognition task is designed to help PhD students prepare formal materials for their research projects." Then, we invited the participants to provide their names (nickname, initials, or any other preferred name) so that the PhD students could acknowledge their contributions in their work. We manipulated the magnitude of the reward (i.e., goal value) by informing them that "22 (i.e., large reward)/ 2 (i.e., small reward) PhD students will rely on your help in preparing the materials for their research. The more codes you convert, the greater help you provide for their research."

After reading the instructions, the participants commenced the task. Similar to Study 1A, the program launched a loading page and explained the following: "Please wait while the system is initiating. If it takes too long, press "Shift + F" to resend the signal and accelerate the loading." We recorded the amount of time the participants waited (in seconds) before pressing the key combo as a measure of their eagerness to commence the task (Kivetz et al., 2006). To ensure that all participants waited the same amount of time before actually commencing the task, once the participants pressed the key combo, the page reloaded. The amount of time the page required to reload and show the question page depended on when the participant pressed the key combo; thus, all participants waited 120 s in total before viewing the formal task. For the participants who did not press the key combo, the program automatically started after 120 s.

Similar to previous studies, we chose the code recognition task because this task is a typical effort-based, pay-to-work task that requires limited skill. We provided the participants 40 gotcha codes in each round, which was more than they could complete in 2 min. The participants were free to choose the lines that they were confident that they could recognize. We recorded the total number of lines of code the participants converted during the first round as a measure of their effort intensity in the task.

After finishing the first round of the formal task, all participants encountered a loading page stating "Please wait while Round 2 is loading." The onscreen instructions specifically explained that if they preferred not to wait, they could quit at any time by pressing the "Shift + Q" keys to skip the remaining tasks, but we would sincerely appreciate their waiting and continued effort. This loading page remained on the screen for 3 min, and then, Round 2 was initiated if participants had not quit. We measured the participants' willingness to terminate the pursuit by recording their waiting time on this loading page before quitting (Zhang & Huang, 2010). The longer they waited, the more persistent they were in adhering to the pursuit.

Before signing-off, all participants responded to three questions as a manipulation check of the reward magnitude ("To what extent do you think that it is important to complete the task and be acknowledged?", "To what extent do you think that it is meaningful to complete the task and be acknowledged?", and "To what extent are you concerned with whether you can complete the task and be acknowledged?" 1 = Very little, 7 = A great deal, Cronbach's α = 0.914). After quitting or completing the task, the participants received their compensation. The participants were debriefed via e-mail one week after the experiment.

5.2. Results and discussion

5.2.1. Manipulation check

We averaged the ratings of the three questions measuring the participants' perceived reward magnitude and submitted these averages to a one-way ANOVA. The results confirmed that the participants who were informed that 22 PhD students ($M = 4.89$, $SD = 1.31$) would rely on their work and acknowledge their contribution considered the task more important and meaningful than the participants who were told that only 2 PhD students would use their work ($M = 4.45$, $SD = 1.52$; $F(1, 192) = 4.49$, $p = .035$, $\eta^2 = 0.023$).

5.2.2. Eagerness

We conducted separate comparisons of goal eagerness, effort intensity, and willingness to terminate the pursuit between the large- and small-reward conditions. A one-way ANOVA of the time the participants waited before leaving the loading page revealed that those under the large-reward condition spent less time on the page ($M = 53.88$ s, $SD = 39.68$) than those under the small-reward condition ($M = 68.45$ s, $SD = 42.45$; $F(1, 192) = 6.13$, $p = .014$, $\eta^2 = 0.031$; see Fig. 1), indicating that the larger reward rendered the participants more eager to commence the task. As a robustness check, a log-rank test of the equality of the survival functions (Kaplan–Meier) of eagerness revealed similar results, $\chi^2(1) = 10.90$, $p = .001$.

5.2.3. Effort intensity

The results showed that the participants under the large-reward condition completed a similar number of code recognition tasks ($M = 11.27$ lines, $SD = 5.42$) as those under the small-reward condition ($M = 12.66$ lines, $SD = 7.11$; $F(1, 192) = 2.35$, $p = .127$, $\eta^2 = 0.012$; see Fig. 2). This pattern of effort investment replicated the findings of our previous studies and again provided evidence supporting our hypothesis that knowing that more PhD students will acknowledge their work (i.e., a higher degree of goal importance) led to increased goal eagerness but did little to enhance the amount of effort the participants actually invested in the task. In addition to the total number of codes converted, we examined whether the reward magnitude manipulation changed the number of lines of code that the participants converted correctly. The results revealed the same pattern ($M_{large} = 11.07$ lines, $SD = 5.39$ vs. $M_{small} = 12.57$ lines, $SD = 7.09$; $F(1, 192) = 2.74$, $p = .100$, $\eta^2 = 0.014$).

5.2.4. Willingness to terminate the pursuit

We further examined the effects of the reward magnitude on the participants' willingness to terminate the pursuit. The results revealed that fewer participants under the large-reward condition terminated the pursuit before the page refreshed (38.1%) compared with those under the small-reward condition (55.7%; $\chi^2 = 5.98$, $p = .014$, $OR = 1.43$, see Fig. 3). We further examined the amount of time that all participants (including the participants who quit and those who did not) waited on the loading page (range from 0 to 180 s). On average, the participants under the large-reward condition persisted longer ($M = 131.69$ s, $SD = 70.36$) on the loading page than those under the small-reward condition ($M = 105.90$ s, $SD = 76.99$) before they decided to quit ($F(1, 192) = 5.93$, $p = .016$, $\eta^2 = 0.030$). As a robustness check, the Breslow test of equality of the survival functions (Kaplan–Meier) of willingness to terminate the pursuit remained significant, $\chi^2(1) = 4.39$, $p = .036$.

The findings of Study 2 provided evidence supporting our hypothesis that altering the magnitude of the goal value can drive motivation fluctuation, but only when it involves deliberation regarding potential behavioral changes. Examples of such moments include when

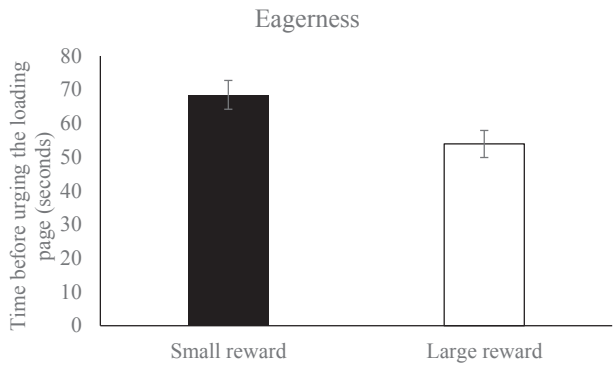

Fig. 1. Eagerness as a function of the reward magnitude (Study 2). Error bars represent the *SE*s.

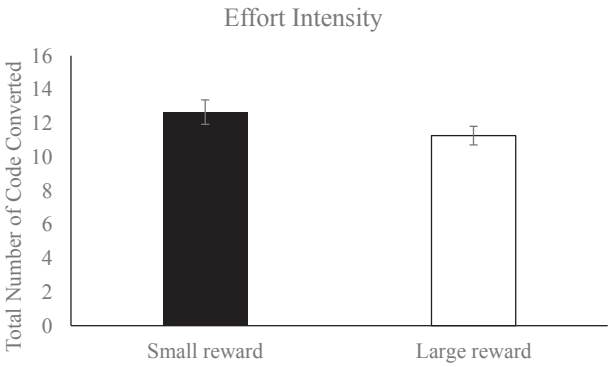

Fig. 2. Effort intensity as a function of the reward magnitude (Study 2). Error bars represent the *SE*s.

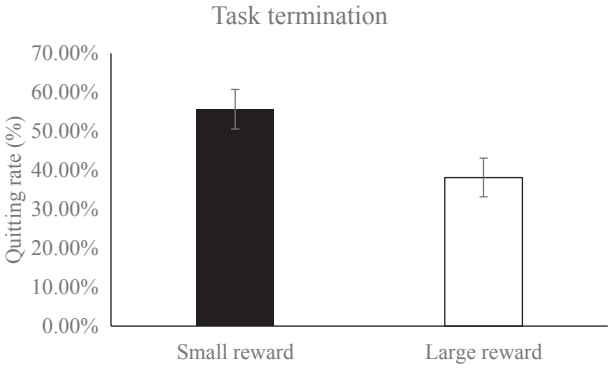

Fig. 3. Rate of quitting as a function of the reward magnitude (Study 2). Error bars represent the *SE*s.

individuals are ready to commence goal-directed actions (i.e., motivation is shown through goal eagerness) or when they are ready to terminate actions (i.e., motivation is shown through goal persistence). At these goal choice moments, rewards are highly relevant, and assessment processes regulate individuals' psychological resources; thus, motivation is susceptible to changes in the reward magnitude. However, at other moments that involve no obvious behavioral changes, such as when individuals are simply performing specific actions and progressing from state to state (i.e., goal striving), individuals' motivation fluctuation becomes less sensitive to the reward magnitude.

Study 2 also addressed an important alternative account of the null effect on the effort intensity in the previous two studies. Although we observed that people's effort investment did not vary according to the reward magnitude, the null effects may have reflected only that one's motivation fades over the course of the pursuit and that all incentives become equally (in)effective over time. However, the findings of Study 2 imply that this explanation is unlikely. Although the large- and small-reward groups did not differ in their effort investment, they showed different levels of goal persistence when they had an opportunity to terminate the goal (e.g., when people again switched to the goal choice process). This pattern suggests that the distinctive aspects of motivation and the corresponding regulation processes at different phases of goal pursuit, rather than time, accounted for the observed effect.

Notably, we do not argue that the reward magnitude is irrelevant in motivating people in actual pursuit. Instead, we emphasize that depending on the stage of the goal pursuit, certain factors (the reward magnitude in our case) may facilitate a specific aspect of motivation (i.e., eagerness) but will not necessarily exert a similar impact on other aspects of motivation (i.e., intensity of effort investment). These divergent effects of the reward magnitude occur because when individuals are in the process of carrying out goal-directed actions, the overall reward becomes less relevant for the task, and their actions are regulated by locomotion processes. If this is the case, the overall value of the goal should still affect the intensity of the effort if the value remains relevant and is maintained in the foreground when people engage in specific goal actions. Our next study tests this hypothesis.

6. Study 3

Study 3 explored whether the effort intensity may also fluctuate with changes in the reward magnitude when the reward is kept relevant during the goal striving phase. Our reasoning suggests that in a natural setting, once people progress to the goal striving phase, the reward becomes less relevant for the specific actions; thus, people engage in an automatic process and perform goal-directed actions to progress toward the goal. Therefore, if we render the reward salient and, therefore, more relevant throughout the process, people should always be mindful of its impact, and their efforts should be more likely to fluctuate consistently with the reward magnitude.

6.1. Methods

6.1.1. Participants and design

In exchange for monetary rewards, 294 undergraduates (63.9% female, $M_{age} = 19.24$, $SD = 1.32$) from a large public university participated in this study. Given that another between-subjects manipulation was added to the design, we targeted a minimum sample size of 256 for Study 3 (and Study 4) and recruited as many participants as possible during the predetermined experiment period. The study adopted a 2 (reward magnitude: small vs. large) × 2 (reward relevance: high vs. control) between-subjects design, and we measured two aspects of motivation (eagerness and effort intensity) per participant.

6.1.2. Procedures

The participants were recruited to perform an alleged "Finger Dexterity Test" using personal computers in separate cubicles. The cover story presented to the participants was that the experimenters were interested in human finger motion skills and that their task was to click on a target figure on the screen as fast as possible for 120 s. The shape and position on the screen of the target figures randomly changed (see the Appendix for examples). The participants were informed that only clicks that fell into the range of the figure would be counted and that they could receive a bonus if they outperformed half of all participants. Similar to the arithmetic task in the previous experiment, this task required limited skill.

Similar to Study 1A, we manipulated the reward magnitude by varying the monetary value of the bonus. The participants under the large-reward condition worked to win a bonus of 100 RMB (approximately $15) if they could outperform half of the participants, whereas those under the small-reward conditions worked to win 10 RMB (approximately $1.50).

After reading the instructions and practicing for 5 s, the participants were presented with the same loading page as described in Study 1A. We recorded the amount of time they waited before pressing the "Shift + F" keys to notify the administrator as a measure of their eagerness to commence the task. Again, we inserted a time controller to ensure that all participants waited the same amount of time (120 s) before commencing the task.

The participants proceeded to the main task after 2 min of waiting. Under the control condition, we presented the sentence "Please click the target figure as fast as you can within 120 s" at the top center of the screen throughout the clicking task. Under the high reward relevance condition, we presented the sentence "Please click the target figure as fast as you can within 120 s to win 10 RMB/100 RMB," which presented the reward amount ("10 RMB" or "100 RMB" depending on the condition) highlighted in red. We recorded the number of clicks the participants performed within 120 s as a measure of their effort intensity. After

completing the task, all participants were rewarded and dismissed.

6.2. Results and discussion

We analyzed goal eagerness and effort intensity as two separate variables across four groups. Because the reminder manipulation was administered after the measure of eagerness but before the measure of effort, we did not expect the reminder to have any effect on eagerness, and thus, we conducted a one-way ANOVA (reward magnitude: small vs. large) of the participants' eagerness. The participants under the large-reward conditions ($M = 61.52$ s, $SD = 34.24$) waited significantly less time before summoning the experimenter than those under the small-reward conditions ($M = 71.32$ s, $SD = 36.33$), $F(1, 292) = 5.62$, $p = .018$, $\eta^2 = 0.019$. As a robustness check, a log-rank test of equality of the survival functions (Kaplan–Meier) of eagerness revealed similar results, $\chi^2(1) = 5.71$, $p = .017$.

Then, we conducted a 2 (reward magnitude: small vs. large) × 2 (reward relevance: control vs. high) ANOVA of the participants' intensity of effort investment (i.e., number of clicks within 120 s). This analysis revealed a reward magnitude × reward relevance interaction ($F(1, 290) = 5.25$, $p = .023$, $\eta^2 = 0.018$). Specifically, when the participants were not reminded of the reward, a larger reward did not improve the participants' effort intensity in the task ($M_{small} = 596.42$ clicks, $SD = 117.55$ vs. $M_{large} = 581.15$ clicks, $SD = 122.31$; $F(1, 290) = 0.72$, $p = .396$, $\eta^2 = 0.002$). However, when the reward was relevant during the goal striving phase, increasing the reward magnitude significantly improved the participants' effort intensity ($M_{small} = 591.16$ clicks, $SD = 99.87$ vs. $M_{large} = 634.06$ clicks, $SD = 90.48$; $F(1, 290) = 5.73$, $p = .017$, $\eta^2 = 0.019$). On average, maintaining the reward salient marginally enhanced the intensity of effort investment (and therefore effort-based performance) in this task ($M_{relevance} = 611.59$ clicks, $SD = 97.59$ vs. $M_{control} = 588.11$ clicks, $SD = 120.00$; $F(1, 290) = 3.52$, $p = .062$, $\eta^2 = 0.012$) presumably because the salience of the reward increased its relevance even when the participants were performing specific actions. However, increasing the magnitude of the reward had no significant impact on the actual effort intensity ($F(1, 290) = 1.19$, $p = .277$, $\eta^2 = 0.004$). Fig. 4 illustrates these results.

Study 3 replicated the observed effects on goal eagerness and showed that increasing the reward magnitude induced the participants to show greater eagerness in commencing the task. Regarding effort intensity, we also replicated the earlier findings showing that the participants' actual intensity of effort investment during the task did not differ when expecting a small versus a large reward. However, when a reminder of the reward rendered the reward relevant throughout the task, the participants who expected to receive a large reward showed higher levels of effort investment than those who expected to receive a small reward.

These findings provide important evidence supporting our theory that two important aspects of motivation, namely, eagerness and effort

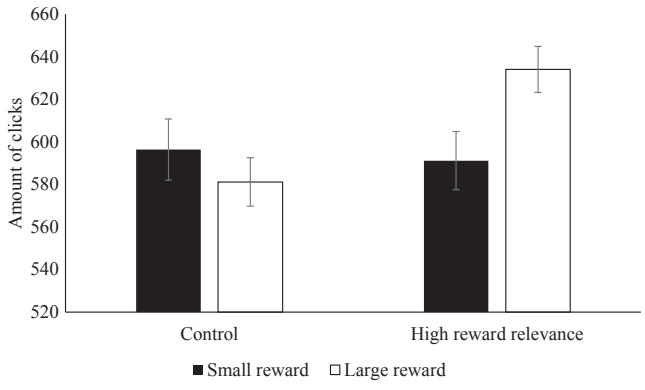

Fig. 4. Effort intensity as a function of the reward magnitude and reward relevance (Study 3). Error bars represent the *SE*s.

investment, respond differently to rewards depending on the process of the goal pursuit. Although eagerness is highly susceptible to the size of the reward, the effort investment is not. This insensitivity likely occurs because once individuals commit to the pursuit and initiate the actions, the reward becomes less relevant to carrying out the present actions. The findings of Study 3 further suggest that the null effect of effort investment observed in the previous studies was not a product of a simple ceiling or floor effect.

Although this study demonstrated that the reward magnitude normally has no impact on one's effort intensity during the goal striving phase, the following practical question remains to be answered: how can managers make one's effort more consistent with the reward? We reason that individuals' effort intensity does not change with the reward because the reward magnitude only affects deliberation. When people progress into a state of acting instead of deliberating (i.e., once they start the actual pursuit), the solution should be to directly link the content of the deliberation prior to commencing the goal to effort investment. For example, by asking people to make specific action plans at the time of the goal choice, we link the reward to specific actions that individuals are likely to perform, thereby ensuring that the reward size can have a meaningful impact on the effort intensity. Study 4 tests this hypothesis.

7. Study 4

Study 4 varied the reward magnitude and instructed the participants to generate specific action plans before commencing the task. We expected that generating specific action plans prior to commencing the task functions as a pre-commitment process that links the reward magnitude to effort investment. This planning procedure considering the reward should provide more specific guidelines for effort investment even during the goal striving stage. Even when the reward becomes less relevant as the pursuit is well under way, if individuals follow the plans that they make prior to commencing the task, their effort investment should be more consistent with the magnitude of the reward.

7.1. Methods

7.1.1. Participants and design

In exchange for monetary rewards, 326 students (59.5% female, $M_{age} = 19.01$, $SD = 1.23$) from a large public university participated in this study. Similar to Study 2, we targeted a minimum sample size of 256 participants and recruited as many participants as possible during the predetermined experiment period. The study adopted a 2 (reward magnitude: small vs. large) × 2 (planning: no vs. yes) between-subjects design, and we measured two aspects of motivation (eagerness and effort intensity) per participant. Notably, the main objective of this study is to examine whether instructing the participants to generate specific action pursuit plans while considering the reward magnitude could link the reward magnitude to the actual effort intensity. Thus, we manipulated the planning process after the measure of the participants' eagerness but before the measure of effort.

7.1.2. Procedures

The cover story informed the students that this study was conducted in collaboration with an external agency to learn more about their preferences for advertising channels. The participants were asked to report their preferred advertising channels for five product categories and provide detailed reasons for their choices. The participants were told that their answers would be evaluated by the agency for richness and value and that those who provided answers that were deemed valuable would receive an additional cash bonus. The participants under the large-reward conditions were told that the bonus was 100 RMB (approximately $15), whereas those under the small-reward conditions were told that the bonus was 10 RMB (approximately $1.50).

After reading the instructions, we provided the participants with an example to illustrate the rules. Because our participants were mainly

students studying business, we created questions that were relevant to their major. The participants read the following: "Imagine that you are the brand manager of a new shampoo. Please indicate which one of the following advertising channels you prefer to use and explain why you think that it is the most appropriate for this product." Then, the participants selected one of nine advertising channels (e.g., TV, newspaper, or search engine) and listed as many reasons for their choice (e.g., "Channel prices are relatively reasonable") as they wanted.

To measure goal eagerness, we presented the participants with a consent form before they could commence the task. The onscreen instructions required the participants to carefully read the document, agree to multiple items and provide some basic personal information (e.g., student ID, gender, and age) before proceeding to the test. We recorded the amount of time the participants spent on this section as a measure of eagerness, with more eager participants being more likely to skim through.

After signing the consent form, half of the participants were directed to a planning procedure, and the other half proceeded directly to the main task. Under the planning condition, we asked the participants to think about how they would evaluate the different options and generate specific plans to help them evaluate and report their thoughts. The participants were told that they could type notes regarding these plans if they felt that such an action might be helpful. After deliberating regarding how they would evaluate and generate specific plans, the participants proceeded to the main task. The task again contained five rounds, and each round contained one question. We instructed the participants to justify their choices and provide as many details as possible. This task had no time limit, and all participants were informed that if their answers had more details, they would be more likely to receive the bonus. We counted the number of words the participants wrote to justify their choices as a measure of their effort intensity. After completing the task, the participants were rewarded and dismissed.

7.2. Results and discussion

7.2.1. Eagerness

Because the planning manipulation was administered after the measure of eagerness but before the measure of effort, we did not expect the planning to have any effect on eagerness, and thus, we conducted a one-way ANOVA (reward magnitude: small vs. large) of the participants' eagerness (i.e., how much time they spent on the consent form). The analysis revealed a significant effect of the reward magnitude ($F(1, 324) = 4.68$, $p = .031$, $\eta^2 = 0.014$). Specifically, the participants under the large-reward conditions ($M = 39.22$ s, $SD = 15.01$) skimmed and signed the consent form faster than those under the small-reward conditions ($M = 42.77$ s, $SD = 14.51$).

7.2.2. Effort intensity

We further conducted a 2 (reward magnitude: small vs. large) × 2 (planning: no vs. yes) ANOVA of the participants' effort intensity. The analysis first revealed two main effects. The participants working for a large reward wrote more detailed answers ($M = 398.72$ words, $SD = 359.09$) than those working for a small reward ($M = 319.29$ words, $SD = 222.47$; $F(1, 322) = 6.29$, $p = .013$, $\eta^2 = 0.019$). The planning procedures also enhanced the participants' levels of effort such that those who generated specific plans wrote more words ($M = 465.42$ words, $SD = 361.98$) than those who made no plans ($M = 251.77$ words, $SD = 172.37$; $F(1, 322) = 47.15$, $p < .001$, $\eta^2 = 0.128$).

More importantly, this analysis revealed a significant planning × reward magnitude interaction ($F(1, 322) = 5.91$, $p = .016$, $\eta^2 = 0.018$). Specifically, increasing the reward size did not improve the participants' effort in the task when there was no planning procedure ($M_{small} = 250.58$ words, $SD = 179.59$ vs. $M_{large} = 252.95$ words, $SD = 165.95$; $F(1, 322) < 0.01$, $p = .957$, $\eta^2 < 0.001$). However, when the participants generated specific plans before commencing the main task, increasing the reward led to greater effort intensity in the task as follows: those working for a large reward wrote more words ($M = 540.98$ words, $SD = 433.56$) than those working for a small reward ($M = 388.00$ words, $SD = 249.63$; $F(1, 322) = 12.27$, $p = .001$, $\eta^2 = 0.037$; see Fig. 5).

Study 4 provided important evidence related to the psychological process underlying the observed effect. By instructing people to generate specific plans for completing the task, we linked the reward magnitude with effort investment, allowing the participants to follow the specific pre-commitment that they made prior to commencing the goal-directed actions. The magnitude of the reward, therefore, exerted its impact on actions throughout the pursuit.

If reward indeed fails to motivate actions because it becomes irrelevant for the performance of specific actions, a reasonable solution to the issue that effort does not fluctuate with reward might be to link each goal-directed action with partial rewards. This structure should render the reward relevant for all specific actions that one performs and allow the reward magnitude to have a direct impact on effort investment. Our next study tests this possibility.

8. Study 5

In Study 5, we manipulated the reward structure by allocating partial rewards to each goal-directed action. The expectation is that this structure directly associates each goal-related action with a certain amount of reward; hence, reward should remain relevant for each action, and the completion of each action would be similar to the overall goal initiation and, therefore, be sensitive to the magnitude of the reward.

8.1. Methods

8.1.1. Participants and design

Based on a predetermined sample of 60 participants per condition, we established a HIT for 300 assignments on Amazon Mechanical Turk. In exchange for monetary rewards, 305 workers participated in this study; of these participants, 28 failed the attention check, and 277 eligible participants remained (44.4% female, $M_{age} = 36.21$, $SD = 11.68$). This study used a 5 (reward structure: small overall reward with no action reward vs. large overall reward with no action reward vs. small overall reward with small action reward vs. large overall reward with small action reward vs. large overall reward with large action reward) between-subject design, and we measured two aspects of motivation (eagerness and effort intensity) per participant (see Table 1 for an illustration of the different reward schemes).

8.1.2. Procedures

Using the same finger dexterity task as described in Study 2, we measured the time the participants spent on a "warm-up practice" to capture their eagerness. We assessed their effort intensity by recording

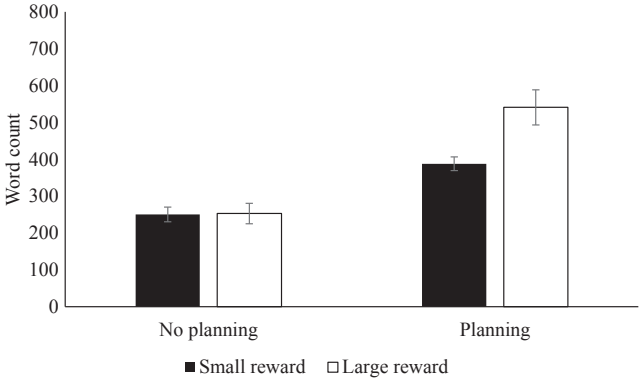

Fig. 5. Effort intensity as a function of the reward magnitude and planning (Study 4). Error bars represent the *SE*s.

Table 1
Reward scheme in Study 5.

Group	Condition	Rewards per round ($)	Rewards for completing all five rounds ($)	Overall reward magnitude ($)	Number of participants	Eagerness (seconds)	Effort intensity (clicks)	Overall performance
1	Small overall reward + no action reward	0.00	0.50	0.50	57	32.53 (10.80)	269.44 (244.12)	49.1%
2	Large overall reward + no action reward	0.00	1.50	1.50	53	29.74 (9.78)	226.38 (108.48)	41.5%
3	Small overall reward + small action reward	0.05	0.25	0.50	58	31.65 (9.77)	228.41 (82.22)	50.0%
4	Large overall reward + small action reward	0.05	1.25	1.50	57	28.92 (9.27)	270.35 (107.48)	68.4%
5	Large overall reward + large action reward	0.25	0.25	1.50	52	30.27 (9.99)	260.23 (133.43)	57.7%

* Numbers in the cells of eagerness and effort intensity denote the mean (*SD*).

the number of clicks within the allocated timeframe in the main task.

The participants were recruited to complete a 3-minute irrelevant online survey for a payment ($0.50). After they finished the survey, we invited them to join a "Finger Dexterity Test" for a bonus. The task required the participants to click a target figure on the screen as fast as they could within an unknown time span. To manipulate the overall reward magnitude, we informed the participants that the extra bonus for this test was either $0.50 (small-reward condition) or $1.50 (large-reward condition). The onscreen instructions explained that "The test includes five rounds, 7–10 s per round. In each round, you need to click at least 40 times to pass. Participants who pass all five rounds will receive a bonus." During the actual procedures, each round was presented for exactly 8 s. The instructions were designed to minimize the learning effect and ensure that the participants clicked as fast as they could in each round.

Although all participants were told that they would receive the bonus only if they completed all five rounds successfully, we structured the components of the overall bonus differently. Specifically, under the small and large overall reward with no action reward condition, the instructions informed the participants that the bonus ($0.50 or $1.50) was only given to those who successfully completed all five rounds. Under the small and large overall reward with action reward condition, we divided the overall bonus ($0.50 or $1.50) into two parts as follows: a reward for passing each round and a reward for completing all five rounds. Under the small overall reward condition, the partial action reward was $0.05 per round, whereas the remaining part ($0.25) was a bonus earned if the participants could complete all five rounds ($0.50 in total, see Group 3 in Table 1). Under the large overall reward condition, the partial action reward was also $0.05 per round, whereas the remaining part ($1.25) was a bonus for completing all five rounds ($1.50 in total, see Group 4 in Table 1). We also included a condition (Group 5 in Table 1) that allocated a relatively larger partial reward per round (i.e., $0.25 per round) and a smaller reward for completing all five rounds (i.e., $0.25 for completing all five rounds). Although both Groups 4 and 5 had equal overall large-reward magnitudes (i.e., $1.50) and partial rewards allocated to each individual action, the size of the rewards allocated to each action differed. Through this design, we could examine whether merely allocating a nominal amount of reward to each goal-directed action (i.e., establishing a link between the reward and the action) would be sufficient to improve the susceptibility of the effort investment to differences in the reward magnitude and how the size of the partial reward allocated to each action would matter.

After explaining the reward structure, the participants performed a "warm-up practice" before the formal test. During the practice, the participants were asked to uncheck 30 checked options by clicking the mouse to "warm up" (see the Appendix for an illustration). The onscreen instructions emphasized that although performance in this warm-up practice would not influence their bonus, all participants were required to perform the practice session before proceeding to the main test. We measured the speed at which the participants completed this warm-up practice as a measure of their eagerness.

After practicing, the participants commenced the main test. At the end of the test, the system automatically calculated the number of times the participants clicked in all five rounds, and the participants were informed whether they completed the task successfully. We delivered the appropriate payments three days after the experiment.

8.2. Results and discussion

8.2.1. Eagerness

We first compared the eagerness level between the participants who were promised a $1.50 and a $0.50 total reward (including those with and without a partial reward structure). The analysis revealed that increasing the overall size of the reward motivated the participants to begin the task sooner ($M_{small} = 32.13$ s, $SD = 10.29$, $N = 115$ vs. $M_{large} = 29.61$ s, $SD = 9.60$, $N = 162$; $F(1, 275) = 4.36$, $p = .042$, $\eta^2 = 0.015$), replicating the previous findings showing that individuals' eagerness increases as the overall reward magnitude increases regardless of whether partial rewards were allocated to each action. The non-parametric Kruskal-Wallis test revealed similar results. See Table 1 for the descriptive results of each condition.

8.2.2. Effort intensity

We further examined the effects of the overall reward magnitude and the reward structure on the participants' effort. We used the number of clicks in the task as a measure of the effort intensity because this simple repetition indicates the amount of effort the participants invested in the task. Replicating our previous findings, when no partial reward was allocated to each action, increasing the overall reward magnitude did not significantly change the participants' actual effort intensity ($M_{small} = 269.44$ clicks, $SD = 244.12$, $N = 57$ vs. $M_{large} = 226.38$ clicks, $SD = 108.48$, $N = 53$, $F(1, 108) = 1.39$, $p = .241$, $\eta^2 = 0.013$). However, when a partial reward was allocated to each action, the magnitude of the overall reward had a significant effect on the effort intensity. Even when a small nominal partial reward (i.e., $0.05) was assigned to each action, the participants who expected to receive a large overall bonus (i.e., $1.50) were more engaged in the task ($M = 270.35$ clicks, $SD = 107.48$, $N = 57$) than those who expected to receive a small overall bonus ($0.50; $M = 228.41$ clicks, $SD = 82.21$, $N = 58$; $F(1, 113) = 5.34$, $p = .020$, $\eta^2 = 0.047$). This result is consistent with our earlier findings that the magnitude of the reward does not influence individuals' levels of effort investment once they are in the pursuit stage unless the participants were mindful of the reward during the goal striving process (Study 3).

Interestingly, the effort intensity of the participants who expected a large overall bonus (i.e., $1.50) and partial rewards allocated to each action did not show further improvement by increasing the size of the partial reward for each action from $0.05 ($M = 270.35$ clicks, $SD = 107.48$, $N = 57$) to $0.25 ($M = 260.23$ clicks, $SD = 133.43$, $N = 52$; $F(1, 107) = 0.19$, $p = .662$, $\eta^2 = 0.002$). See Table 1 for a summary. These

results suggest that the mere fact that goal-directed actions were associated with the reward was sufficient to improve the susceptibility of the effort intensity to the reward magnitude and that this influence did not depend on the reward magnitude allocated. Instead, it acted by allowing people to perceive that their individual actions were leading to something, construing the action as being relevant to an end rather than simply being an act.

The analyses of overall performance (i.e., whether the participants clicked at least 40 times per round and passed all five rounds) revealed similar results to the number-of-clicks measure. When no partial reward was allocated to each action, increasing the overall reward magnitude did not significantly increase the participants' overall performance (49.1% $_{small}$ vs. 41.5% $_{large}$, $\chi^2 = 0.64$, $p = .423$, $OR = 0.857$). When a partial reward, even a small nominal one (i.e., \$0.05), was allocated to each round, increasing the overall reward led to higher overall performance (68.4% $_{large}$ vs. 50.0% $_{small}$, $\chi^2 = 3.98$, $p = .046$, $OR = 1.472$). The overall performance of the participants who expected a large overall bonus (i.e., \$1.50) and partial rewards allocated to each action did not further improve by increasing the size of the partial reward for each action from \$0.05 (68.4%) to \$0.25 (57.7%; $\chi^2 = 1.34$, $p = .247$, $OR = 0.629$).

9. General discussion

As a holistic construct, motivation captures the force leading people to accomplish an activated goal (Bandura, 1988; Carver & Scheier, 1990; Fishbein & Ajzen, 1974; Kruglanski, 1996). Motivation is also a continuous variable that is regulated by different psychological processes depending on the goal stage. Enhanced motivation could imply increased eagerness to initiate the first goal-directed action, increased effort investment in performing repeated goal-directed actions, or increased persistence as difficulties arise (e.g., Cervone et al., 1991; Grant, 2008; Oettingen et al., 2001). These indicators capture the different aspects and multi-dimensional nature of motivation.

The current research distinguished pre-initiation goal eagerness from post-initiation effort as two distinctive aspects of motivation and examined how the magnitude of a reward associated with goal attainment influences the fluctuations in these two aspects separately. Study 1A found that individuals working for a large (vs. small) reward were more eager to commence the task, but their effort intensity in the actual pursuit was similar regardless of the reward size. Study 1B replicated this finding by using a more difficult task and extending the goal pursuit timeframe to a longer period. By framing the goal as more or less important instead of varying the magnitude of the monetary reward, Study 2 further demonstrated that altering the benefit associated with goal attainment resulted in consistent fluctuations in both goal eagerness and persistence, which are two motivation aspects regulated by the assessment process. Study 3 found that when the reward was kept relevant throughout the goal pursuit, the participants' effort intensity increased as the reward magnitude increased. Study 4 found that generating specific action plans prior to commencing the task helped individuals establish a link between the reward and their pre-commitment to goal-directed actions. This link enhanced the susceptibility of the effort intensity to the reward magnitude. Finally, by manipulating the reward structure, Study 5 showed that allocating partial overall rewards to each goal-directed action improved the susceptibility of the effort intensity to the reward magnitude.

9.1. Discussion and future research

As one of the most important constructs in psychology, motivation has long been a fascinating topic for researchers from a wide variety of perspectives (Deci, 1971; Festinger, 1957; Lewin, 1935; Neal et al., 2017; Vancouver et al., 2010; Vroom, 1964). A prominent theme in prior research is the identification of the factors that can impact the level of motivation one displays (Kruglanski et al., 1971; Lepper & Greene, 2015; Locke & Latham, 1990). These studies have largely treated motivation as a monolithic construct with measures of enhanced motivation ranging from eagerness to perform (Oettingen et al., 2001), speed of completion (Cervone et al., 1991), intensity of goal-directed actions (Duckworth, Peterson, Matthews, & Kelly, 2007), and persistence toward a goal (Grant, 2008).

The current investigation presents a more detailed analysis of the construct by examining the multiple distinctive aspects of motivation. Our findings suggest that though the various measures used in prior research all capture variations in motivation, each measure may reflect changes in a specific aspect of this construct. Each aspect may be related to different processes of goal pursuit (e.g., goal choice vs. striving), which is governed by different psychological processes and self-regulatory agents (Vancouver et al., 2010). Importantly, these aspects do not always move in the same direction, and they are not equally susceptible to the influence of changes in the same property of a goal.

The perspective of multiple distinctive aspects of motivation allows us to better interpret some of the extant findings in the literature. For example, if motivation can be manifested in different aspects, comparisons of motivational levels and findings should be interpreted with caution. For instance, how could we judge the motivational level of an individual who displays a high level of intensity in goal-directed actions but shows limited persistence compared to a person whose intensity has always been relatively low but who has been very persistent? Similarly, comparing a more eager individual and a more engaged individual, can we conclusively determine who is more motivated? Understanding the different aspects of motivation should allow us to be more specific in these comparisons and achieve a more precise understanding of this important construct.

Our current findings add to the growing literature showing that individuals' motivation at different stages may respond differently to the same property of a goal. In particular, Fishbach and Choi (2012) showed that directing people to attend to the benefits of exercising before they engage in exercising (compared with attending to the workout) increases the amount of time they plan to exercise at the intending stage, but decreases the amount of time they actually exercise at the pursuing stage. The findings of this research show that merely attending to the instrumentality of an activity was enough to impair effort investment in the absence of an actual change in the rewards system. Our research further extends prior work and explores the consequences of changes in the reward system. Therefore, we extended beyond the competition between intrinsic and extrinsic motivation and examined the impact of goal value on motivation during the striving process. We found that in goal striving, particularly when it involves low-level repeated actions, goal value has a minimal impact on one's effort intensity.

The effect observed in Study 3 is particularly interesting, as keeping the reward relevant throughout the pursuit increased the sensitivity of individuals' effort intensity to differences in the reward magnitude. Although the results suggest a clear positive impact of keeping the reward relevant, this change may suggest some underlying theoretical possibilities. For example, it is possible that the individuals in the high reward group simply forgot about the reward while striving for the goal and that such a reminder was simply what they needed to remember what they were working for and, thus, increased their motivation. However, it is also possible that the reminder of a reward returns people to a goal choice mentality such that the reward becomes more relevant, and their motivation again becomes sensitive to the goal value. Although it is beyond the scope of the current investigation, it could be interesting for future research to examine the exact processes through which a reminder of the value of the final goal can enhance motivation during the goal striving stage.

Another interesting question is how the structure of the reward might affect one's eagerness and effort intensity. Although we focus on the type of goal in which partial effort has an impact, whether our findings hold when the goal outcome is all-or-nothing is unclear. For

example, if a higher performance level is required for a larger reward and failing to perform at the desired level would leave the person with no reward, would the higher reward still result in a negligible increase in effort intensity? This question represents a critical conceptual difference as the structural change should affect goal expectancy prior to initiation. Thus, we would expect an impact during the goal choice stage. There are reasons to believe that individuals would respond differently under this condition, and it could be interesting for future research to empirically examine this difference.

Notably, our findings do not aim to dispute the ample evidence showing that people do work harder when offered a higher reward (Cameron & Pierce, 1994; Pessiglione et al., 2007; Roesch & Olson, 2004); for example, the long hours that employees work in investment banks and law firms represent convincing anecdotal evidence supporting this perspective. However, a closer examination of such evidence underscores the contribution of the current findings and reveals several interesting possibilities for future explorations.

First, we specifically limited the present investigation to tasks that are simple and borderline repetitive in which effort has a minimal effect on the quality or rate of progress. It could be worthwhile to examine the impact of reward size when the demands of the tasks change, such as when effort changes the quality or rate of progress (e.g., creative work). Would it be helpful or harmful for one's effort and performance? This consideration also raises the practical question of when managers may wish to encourage greater intensity of efforts. For example, although a production line or call center manager may want to motivate employers to exert a greater effort intensity in accomplishing their repeated tasks, this might not be the case for a product development supervisor who wants to motivate more creativity in their engineers, because focusing engineers on reward information might interfere with their work and reduce the cognitive resources available for their highly critical tasks with a high cognitive load.

Furthermore, the present research limited the reward to a reasonable range, and therefore, it could be interesting to explore whether the reward has no impact on effort investment at all ranges or whether it is a plateau-like function. Specifically, would it be possible for a reward that is so low that people are barely engaged to lead to decreased effort intensity. As the reward increases, effort increases accordingly but only to a certain degree; could effort plateau beyond this point? An exploration of this possibility may benefit from a discussion of the demands of tasks as follows: is it possible that this plateau-like effect is particularly likely when the task is relatively simple and the intensity of the effort is considered irrelevant for the quality of performance? When effort is perceived as relevant to the reward, as shown in Studies 4 and 5, it is reasonable to assume that reward may again be effective in motivating the effort intensity. Future explorations examining these possibilities may greatly enhance our understanding of the relations between motivation and reward.

10. Author's note

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CRediT authorship contribution statement

Liyin Jin: Conceptualization, Methodology, Writing – original draft. **Qian Xu:** Methodology, Data curation, Formal analysis, Visualization. **Yajin Wang:** Writing – review & editing. **Ying Zhang:** Conceptualization, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This research was supported by grants from the National Natural Science Foundation of China (No. 72125005, No. 71972046, and No. 71925004).

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.obhdp.2021.08.004.

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