Budgeting Time First Increases Multiple Goal Achievement

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This document includes both the manuscript and the Web Appendix.

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ABSTRACT

Consumers often have multiple goals and limited time to pursue them. Running out of time means that people fail to achieve some (or even all) of their goals. When time constrains multiple goal pursuit, what might help consumers achieve their multiple goals? We propose that a subtle shift in the way people think about setting goals in relation to (limited) time can improve multiple goal success. Six experiments demonstrate that, compared to only setting goals, budgeting time first increases multiple goal achievement. This occurs because, by increasing consideration of time trade-offs between goals, budgeting time before setting goals reduces optimism bias in multiple goal setting. Thus, budgeting time encourages consumers to set more accurate multiple goals that they are more likely to (all) achieve. Importantly, budgeting time increases goal accuracy without reducing total output. People accomplish just as much overall, but budgeting time first increases the number of goals that this same output achieves. Further, by increasing multiple goal achievement, budgeting time has downstream benefits for subjective well-being. This research contributes to understanding of the relationship between goals and time, multiple goal setting and pursuit, and opportunity costs. The findings also have substantive implications for consumer goal pursuit and well-being.

Keywords: Goal setting, multiple goals, time, budgeting, opportunity cost, trade-offs, well-being

Every day, consumers pursue multiple goals in a limited amount of time. Within a single weekday morning hour, a working parent may need to triage emails, walk the dog, and feed the family breakfast. The last hour of the same day may include goals to advance a home improvement project, do household chores, and unwind by watching some TV. On vacation, consumers may have goals to see local attractions, try regional cuisine, and bond with family members or friends. At the start of a new year, people may have goals to increase physical activity, cultivate hobbies, and cook more at home.

All too often, however, people run out of time to achieve their multiple goals (Ariely and Wertenbroch 2002; Fernbach, Kan, and Lynch 2015; Jhang and Lynch 2014; Zauberman and Lynch 2005). Time is a scarce resource (Shah, Shafir, and Mullainathan 2015; Spiller 2019). With only 24 hours in a day, consumers rarely have enough time to accomplish all that they wish (or need) to do. Even goals that seem unrelated to time (e.g., financial goals or healthy eating goals) can require time to pursue (e.g., researching retirement plans, meal planning and preparation). People also tend to underestimate how long their various tasks will take (Buehler, Griffin, and Ross 1994; Kahneman and Tversky 1977), exacerbating the challenge of achieving multiple goals in limited time.

When time constrains multiple goal pursuit, one solution is to prioritize. Prioritization entails considering the relative importance of one's multiple goals and eliminating those that are less important (Fernbach et al. 2015). In many situations, however, consumers have multiple valued goals (e.g., professional and social) that are difficult to rank order, or goals that they lack the discretion to reject in their entirety (e.g., work assignments, social obligations). Moreover, even if a goal is relatively less important (e.g., health and self-care goals may seem less important than professional, social, and financial goals), it is still a "goal," so presumably it too is something consumers value and would like to achieve (at least sometimes). Pursing the most important goal first may increase the chance that goal is accomplished (Fernbach et al. 2015); but this cannot benefit (and would presumably even hurt) achievement of other goals (e.g., the second or third goal pursued in a sequence).

Given limited time to pursue multiple goals, how can consumers increase their chances of overall success? What could make people more likely to achieve not just their most important goal, but *all* of their multiple valued goals?

The current research proposes that a subtle shift in the way consumers think about setting multiple goals in relation to (limited) time can improve multiple goal outcomes. In particular, we suggest that, compared to just setting goals (i.e., specifying a desired level of performance; Heath, Larrick, and Wu 1999; Locke and Latham 1990), budgeting time before setting goals can increase multiple goal achievement. We suggest this occurs because budgeting time first increases consideration of trade-offs in time use, reducing optimism bias in multiple goal setting. Budgeting time first therefore encourages consumers to set multiple goals that are more accurate (i.e., less overly optimistic), which they are better able to achieve within the available time. Importantly, we theorize (and empirically show) that budgeting time first improves goal setting accuracy without reducing how much people do overall (i.e., total output), and can even increase output on later goals. We further demonstrate that, by increasing multiple goal achievement, budgeting time first promotes well-being (e.g., increased self-efficacy, more positive and less negative affect; Bandura and Locke 2003; Brunstein 1993; Heath et al. 1999).

These findings make three main contributions. First, they advance knowledge of the relationship between goals and time. Whereas substantial research has explored the consequences of mismanaging time during goal *pursuit* (Ariely and Wertenbroch 2002; Buehler et al. 1994; Fernbach et al. 2015; Jhang and Lynch 2014), less is known about how time factors into goal *setting*. We identify budgeting time-first as a proactive approach that encourages consumers to better incorporate time constraints into initial performance estimates, resulting in more accurate multiple goals.

Second, the findings expand understanding of multiple goal setting and pursuit. Whereas robust findings indicate that specific, high goals recruit additional resources and increase performance on a single focal goal (Locke et al. 1981; Locke and Latham 1990, 2002), we posit that for multiple goal pursuit (with limited time), setting overly optimistic goals comes at a cost. Directing additional time to one (high) goal reduces time available for other goals, exacerbating goal failure (without producing offsetting benefits for total output). We find that budgeting time first encourages consumers to set more accurate (i.e., less overly optimistic)—but importantly, equally motivating—multiple goals that are more likely to (all) be achieved.

Third, the findings extend research on opportunity costs (Frederick et al. 2009; Plantinga et al. 2018; Spiller 2011, 2019). We identify resource budgeting (i.e., disaggregating a shared resource pool) as important for increasing opportunity cost consideration during multiple goal setting, even when total constraint and alternate uses are salient.

OPTIMISM BIAS IN GOAL SETTING

Goal setting refers to specifying a desired level of task performance (i.e., a specific target to strive for; Bagozzi and Dholakia 1999; Heath et al. 1999; Locke and Latham 1990; Locke et al. 1981). Consumers set goals for domains typically associated with performance assessment, such as how many miles to run when training for a marathon or how many points to score on an academic exam, as well as everyday pursuits such as how many steps to take, how many connections to make on LinkedIn, and which stores to visit on a shopping trip. Even goals with a fixed performance level (e.g., paying off a loan, completing a degree) are often pursued by setting subgoals for continuous, flexible behaviors (e.g., how much of a paycheck to allocate towards the debt, how many credits to take in a semester).

Although consumers set goals that they value and expect to achieve (Bandura and Locke 2003; Campbell and Warren 2015; Kopetz et al. 2012; Kruglanski 1996; Locke and Latham 2002; Polivy and Herman 2002; Tanner and Carlson 2009), goal failure is pervasive. Nearly all New Year's resolutions (90%) go unrealized (Statistics Brain 2018). More than 40% of U.S. students who start college fail to earn a degree, more than 80% of workers don't feel sufficiently prepared for retirement, and 40% of marriages end in divorce (EBRI 2018; Luscombe 2018; NSC 2018). Even small goal failures of daily life can add up, such as not hitting a step-count goal (Bassett et al. 2010), eating (less healthy, more expensive) takeout because one ran out of time to cook dinner, or missing out on catching up with a friend.

One reason people fail to achieve goals is they are overly optimistic in goal setting. In forecasting future events, people tend to overpredict desirable outcomes (i.e., "optimism bias"; Johnson and Fowler 2011; Sharot 2011; Tanner and Carlson 2008; Weinstein 1980). Because goals represent desirable outcomes (Austin and Vancouver 1996; Locke and Latham 1990), optimism bias leads people to set goals beyond what they can feasibly achieve. Consumers set goals expecting that they will lose more weight, work out more often, earn greater returns on investments, and spend less time and money in general than they ultimately do (Buehler et al. 1994; Burger and Lynham 2010; DellaVigna and Malmendier 2006; Malmendier and Tate 2004; Sackett at al. 2014; Sussman and Alter 2012; Zauberman and Lynch 2005).

Notably, optimism bias is particularly likely to undermine goal achievement when consumers have multiple goals and limited time. In the context of a single focal goal, pursuing an optimistically high goal can recruit additional resources (e.g., time, money, energy) in the service of that goal, boosting performance (Jhang and Lynch 2014; Locke et al. 1991; Locke and Latham 1990, 2002, 2013; Sackett et al. 2014). In the context of multiple goals (and the constraints of daily life), however, pulling resources towards one optimistically high goal means pulling resources away from other goals (Dalton and Spiller 2012; Etkin 2019; Schmidt and Dolis 2009; Spiller 2019). Imagine a consumer with goals for work (e.g., answering email), exercise (e.g., running), and errands (e.g., shopping) on a weekend afternoon. Pursuing an optimistically high goal for work (e.g., process 100 emails) would recruit more time towards work, leaving less time available for exercise and errands, hurting how much can be done in these domains. Given the tendency to over-resource proximal goals (Jhang and Lynch 2014), even when downstream goals are more important (Fernbach et al. 2015), the time trade-offs inherent in multiple goal pursuit reduce the chance that those multiple (high) goals are achieved.

When consumers have multiple goals and limited time to achieve them, how can they increase their overall success? What might encourage people to set *less* overly optimistic (i.e., more accurate) multiple goals that they are more likely to (all) achieve within the available time?

THE TIME-FIRST APPROACH TO MULTIPLE GOALS

The current research proposes that a subtle shift in the way consumers think about setting multiple goals relative to time can increase multiple goal achievement—budgeting time before setting multiple goals (vs. only setting goals). In particular, we suggest that a “time-first” approach increases consideration of trade-offs in time use during goal setting, encouraging consumers to set less overly optimistic (i.e., more accurate) multiple goals that they are more likely to achieve within the available time.

By a time-first approach, we mean that consumers budget the total available time for multiple goal pursuit across activities before setting goals (i.e., allocate time across tasks before specifying a desired level of performance on each). Consider, for example, a consumer with goals for work (email), exercise (running), and errands (shopping) during three hours on a weekend afternoon. Using a "standard," goals-only approach, he would just set goals for each activity (e.g., process 60 emails, run 5 miles, and create a grocery list that spans multiple stores). Using a time-first approach, however, he would first budget the total time available across activities (e.g., 80 minutes for email, 40 minutes for running, and 60 minutes for shopping), and *then* set goals for each activity. In this case, we suggest the consumer will set multiple goals that are less overly optimistic (e.g., process 30 emails, run 3 miles, and create a one-stop grocery list) that he is therefore more likely to all achieve within the available time. We allow that with the standard goals-only approach, consumers could still consider how much time to spend on each goal (although our findings suggest they don't spontaneously do this sufficiently), but the proposed time-first approach is distinct in that it requires explicitly allocating the total pool of time across goals before specifying a target level of performance on each.

We propose that budgeting time first reduces optimism bias in multiple goal setting by increasing the consideration of time trade-offs between goals. Critical to this prediction is the notion that consumers fail to spontaneously consider opportunity costs. In weighing a focal choice, consumers often neglect the value of foregone alternatives (Frederick et al. 2009; Lynch et al. 2009; Spiller 2011, 2019; Thaler 1980). People overlook how making a specific purchase reduces the money available for other purchases (Frederick et al. 2009; Spiller 2011) and how spending time on one activity leaves less time available for other activities (Fernbach et al. 2015; Spiller 2019). By increasing awareness of trade-offs in resource expenditures, making foregone alternatives explicit can increase opportunity cost consideration (Frederick et al. 2009; Spiller 2011; Weiss and Kivetz 2019). Explicitly reminding consumers that spending money on one product means not spending money others, for example, encourages them to factor the value of foregone alternatives into their decisions (Frederick et al. 2009).

Consequently, by making the time available for each goal explicit prior to goal setting, we argue that budgeting time first should make consumers more aware of how spending more time on one goal means having less time available to spend on others. This increased consideration of trade-offs in time use between goals should encourage consumers to factor the opportunity cost of spending time on any one goal (i.e., having less time to spend on others) into their goal setting decisions, leading them to set less overly optimistic multiple goals. Thus, although consumers may still be optimistic in what they think is achievable within the time they allot to a given task (i.e., goals may still be optimistic) budgeting time first should make goal setting less *overly* optimistic overall, encouraging consumers to set more accurate multiple goals that they are more likely to (all) achieve.

Notably, this prediction relates to how unpacking multifaceted events reduces the planning fallacy in time estimation. Consumers systematically underestimate the time required to complete multifaceted tasks (i.e., the planning fallacy; Buehler et al. 1994; Buehler, Griffin, and Ross 2002; Kahneman and Tversky 1977; Kruger and Evans 2004), in part because they tend to consider multifaceted tasks holistically, rather than in terms of their constituent parts (Kruger and Evans 2004; Savitsky et al. 2005; Tversky and Koehler 1994; Van Boven and Epley 2003; Wilson et al. 2000). Unpacking multifaceted tasks into components (e.g., unpacking "getting ready for a date" into taking a shower, drying hair, and getting dressed; Kruger and Evans 2004) makes the contribution of each part more salient, affording more accurate time estimation. But whereas the prior work argues that unpacking improves accuracy in overall time estimation by drawing attention to how task elements contribute to the whole, we argue that "unpacking" a common resource pool improves accuracy in multiple goal setting by making trade-offs in the time available for pursuing *each* goal more salient. Formally, we predict:

H1: Budgeting time before setting goals (vs. only setting goals) increases multiple goal achievement.

H2: This occurs because budgeting time first increases consideration of trade-offs in time use, which reduces optimism bias in multiple goal setting.

Importantly, given that high goals can increase performance (Locke and Latham 1990), one could wonder if, by encouraging consumers to set lower goals, budgeting time first would reduce how much people do overall (i.e., total output). We argue this will not occur for two reasons. First, as previously discussed, a key mechanism through which high goals increase performance is by recruiting additional resources to advance a single focal goal (Jhang and Lynch 2014; Locke and Latham 1990, 2002). But if motivation is high and the total available time is fixed, then the maximum amount that can be accomplished across goals is relatively inflexible (akin to a "ceiling effect"; Schmidt and Dolis 2009). Second, and more broadly, debiasing techniques typically attenuate, but do not eliminate, forecasting errors (Kruger and Evans 2004; Savitsky at al. 2005; Tanner and Carlson 2009; Wilson et al. 2000). If budgeting time first reduces, but does not eliminate, optimism bias in multiple goal setting, then it may encourage consumers to set goals that are less overly optimistic, but still optimistic (i.e., still challenging; Tanner and Carlson 2009). Thus, we do not expect that budgeting time first will reduce how much consumers do overall; but instead, by calibrating goals to the time available to pursue them, allow that same total output to achieve more of their goals. Thus, we predict:

H3: Budgeting time first results in multiple goals that are more accurate without reducing total output.

Finally, by increasing multiple goal achievement, we suggest that a time-first approach to multiple goal setting will have downstream benefits for subjective well-being. Besides the obvious negative consequences of failing to realize the content of one's goals (e.g., not getting enough exercise), goal failure has negative psychological effects. Failing to achieve goals can increase negative affect, lower self-efficacy, reduce motivation, and result in goal disengagement (Bandura and Locke 2003; Brunstein 1993; Heath et al. 1999; Lewin et al. 1944; Soman and Cheema 2004; Weingarten, Bhatia, and Mellers 2018). Even the same objective level of performance can produce such negative psychological consequences if it fails to meet a goal (Heath et al. 1999; Weingarten et al. 2018). If budgeting time first increases multiple goal achievement, as we suggest, then it should also help buffer against the negative downstream consequences of goal failure. Thus, we predict:

H4: By increasing multiple goal achievement, budgeting time first increases subjective well-being.

Note, we acknowledge that budgeting time before setting goals is best suited for goals with flexible performance targets (vs. goals that have fixed performance targets). A consumer with 30 minutes to spend on email, for instance, can scale her goal for how many messages to answer during that time accordingly. She cannot, however, similarly scale a one-hour commute to work. Whereas answering some emails is better than answering none (and answering more is better than answering fewer), driving only half way to the office offers no benefits. That said, if budgeting time first makes the consumer aware of how devoting an hour of her limited time to her commute is interfering with pursuing other goals, it may still encourage her to take action (e.g., arranging to work from home a few days a week) that would help facilitate multiple goal achievement. We return to this point in the General Discussion and explore how time budgeting may function for different types (and combinations) of fixed and flexible goals.

OVERVIEW OF EXPERIMENTS

Six experiments (and three follow-up studies) test our predictions. All follow the same basic structure. Participants were given a fixed amount of time to spend on multiple tasks. They set goals for those tasks (i.e., how much to do), and then pursued these goals. Our key manipulation was whether participants budgeted time before setting goals (vs. only set goals). We tested multiple goal achievement as the total number of goals achieved (and the likelihood of achieving all goals), optimism bias in multiple goal setting as the level of goals set, overall output as how much people did (i.e., total number of correct answers on the tasks), and accuracy as the discrepancy between goals and output.

Experiment 1 tested our core predictions in an immersive, consumer-relevant paradigm: online shopping. Participants were given a total of seven minutes to shop for real products at two online stores. We manipulated whether they budgeted this total time across stores before setting goals (i.e., how many products to put in each basket), and measured its effects. Experiment 2 explored generalizability by using a different ("quizzes") paradigm with a larger number of goals and diverse tasks. Experiments 3 and 4 further explored our theory by comparing budgeting time *before* goal setting to budgeting time *after* goal setting (experiment 3) and by examining whether the effects hold for "mere goals" and chosen task order (experiment 4). Experiments 5 and 6 directly tested the proposed role of time trade-off consideration by measuring (experiments 5 and 6) and manipulating (experiment 6) consideration of trade-offs in time use during goal setting. Experiment 5 also explores whether the effects hold for an assigned time budget and casts doubt on potential alternative explanations (e.g., elaboration, goal setting difficulty). Finally, experiments 2, 4, and 6 examine downstream consequences for well-being.

All experiments were incentive-compatible and examined real behaviors and goal setting decisions. In each experiment, participants received detailed instructions explaining the paradigm, tasks, and incentives. To reduce the length of this paper, key features of the procedure are reported in the main text. Details on participant instructions, along with an analysis plan for results reporting across experiments, are included in the Appendix. Ancillary results and analyses for each experiment are reported in the Web Appendix (WA).

EXPERIMENT 1: ONLINE SHOPPING

Experiment 1 examines how budgeting time before setting goals affects multiple goal achievement in an immersive, consumer-relevant paradigm: online shopping. Participants set goals for how many products to shop for in two real online stores. All participants had the same total amount of time to shop, and we manipulated whether they budgeted that time across stores before setting goals. We predicted that budgeting time first would increase multiple goal achievement, and that this would occur by attenuating optimism bias in multiple goal setting. Further, we predicted that budgeting time first would increase goal accuracy without reducing how much people did overall (i.e., total shopping output across stores).

Design and method

Participants. One hundred and nine university lab panelists participated in exchange for a small payment and the chance to win the products they chose during the task. In this and subsequent lab experiments, sample size was determined by participant availability and lab resources. Six participants were excluded for restarting the survey after having progressed to the task practice section,[1] leaving a final sample of $N = 103$ (average age 26.42 years, 69.9% women). Participants were randomly assigned to one of two conditions: control versus time-first.

Procedure. First, participants read detailed instructions (see Appendix) and completed a practice task. Participants were told that they would set goals for and complete a shopping spree in two online stores, and they would have the chance to win some of the products they selected, based on their performance.

All participants had a total of 7 minutes to spend shopping at Amazon.com and Target.com. The task entailed selecting real products and placing them into one's "cart" by entering the product URLs and prices into the survey (see WA for stimuli). To qualify as a correct answer, selected products had to cost $10 or less, be unique items (i.e., participants could not select the same product multiple times) and be available for purchase online. Further, products could not be gift certificates, store purchasing cards, prescription drugs, alcohol, tobacco products, firearms, ammunition, pornography, or other age-restricted products. Participants were told that products not meeting these criteria would not count toward their goals, nor would they be awarded as bonus prizes.[2]

All participants familiarized themselves with the task by selecting two products from Walmart.com. The practice page included instructions for how to locate and copy product URLs, as well as suggestions for efficiently finding products priced under $10. On the practice and real

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[1] To ensure participants were equally naïve regarding the tasks and manipulations, in this and all subsequent experiments we exclude participants who restarted the survey after seeing the practice tasks. Potential causes of restarting include technical issues (e.g., connectivity problems during tasks) and user error (e.g., accidentally closing a browser window).

[2] Prior to analyses, a hypothesis-blind research assistant validated participants' responses against the task criteria (i.e., that entered URLs were indeed real URLs from the correct retailer and selected products met the stated criteria). Five participants provided a total of 10 invalid responses (e.g., selecting a gift certificate, selecting the same product multiple times); these responses were retained but were not scored as correct answers.

tasks, each page prominently displayed participants' goals for that store, as well as a reminder regarding requirements for selected products.

The task was incentivized such that all participants scoring in the top 20% of those taking the survey were entered into a lottery, and a single winner received all of the real products selected from one of the two stores (store was randomly selected; participants could not choose a preferred store). The minimum requirement was to select 2 products from each store (maximum of 20). In each store, participants received two points per selected product once their goal was achieved, with no points until the goal was reached and no additional points for exceeding the goal (the lottery prize also excluded any products exceeding the goal). See Appendix for details.

Second, all participants set goals, and we manipulated time budgeting. In the time-first condition, participants first budgeted time to each store (between 1 and 6 minutes per store, summing to 7) and then set goals. In the control condition, participants just set goals. Notably, in both conditions, the total time constraint was made salient on the goal-setting page ("Reminder: You have 7 minutes total to shop at both stores."). The only difference was that in the time-first condition, participants explicitly budgeted that total time across stores before setting goals.

Third, all participants pursued their shopping goals, and we measured task performance. Shopping goals were pursued sequentially in a randomized order. Participants chose when to advance from the first store to the second, but could not go back. On each store page, participants could observe their goal and the number of products in their shopping basket (see WA for stimuli). When the total time was up, the survey exited the tasks; if participants exited the tasks with extra time remaining, they went to a waiting page until the full time was up. To assess multiple goal achievement, we counted the number of goals participants achieved (0-2) as well as whether they achieved all (both) goals (1 = yes, 0 = no).

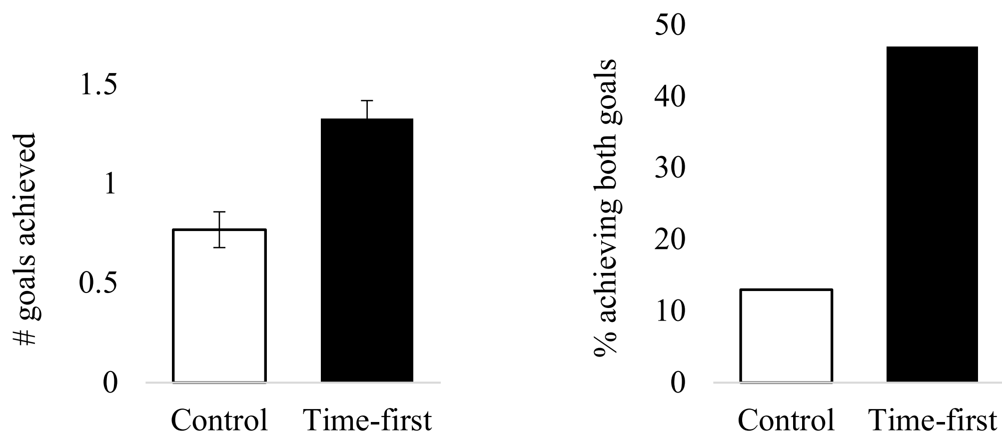
Finally, as a manipulation check for the task incentive, we asked participants, "How motivated were you to try to win the bonus (of a single shopping cart)?" (1 = *Not at all motivated*, 7 = *Very motivated*). This was significantly above the scale midpoint (M = 5.67, SD = 1.73; $t(102) = 9.80$, $p < .001$), and did not differ by condition ($F < 1$).

Results

Multiple goal achievement. As predicted, budgeting time before setting goals increased the number of goals achieved (one-way ANOVA: $F(1, 101) = 16.50$, $p < .001$, $\eta^2 = .14$). Compared to the control (M = .77, SD = .66), participants in the time-first condition achieved significantly more of their goals (M = 1.33, SD = .72; see figure 1 left side).

Further, budgeting time first made participants more likely to achieve *all* of their multiple goals (logistic regression: $b = 1.84$, Wald $\chi^2(1) = 12.81$, $p < .001$, OR = 6.28). Compared to the control (13%), participants in the time-first condition were more likely to achieve both shopping goals (47%; see figure 1 right side). In this and subsequent experiments, see WA for regression analyses of goal achievement for each store.

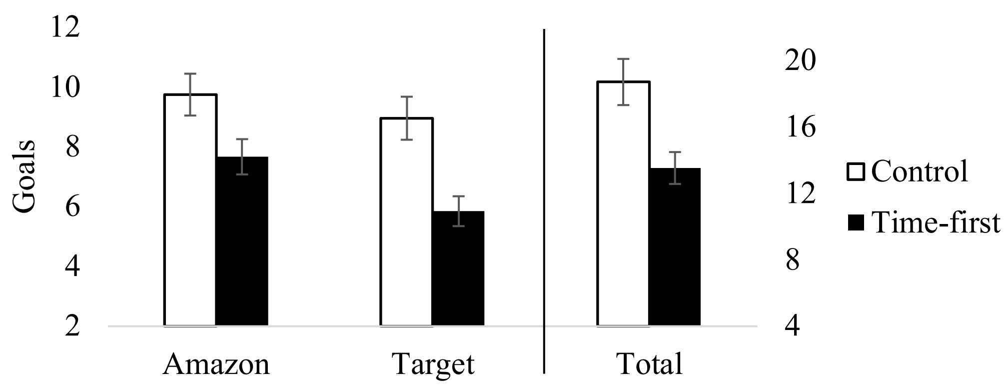
FIGURE 1: BUDGETING TIME FIRST INCREASES MULTIPLE GOAL ACHIEVEMENT



Note: In all figures, error bars represent +/- 1 SE of the mean.

Optimism bias in goal setting. As predicted, budgeting time first reduced optimism bias in multiple goal setting. In addition to an effect of store (i.e., the first vs. second store visited) ($F(1, 101) = 16.54$, $p < .001$, $\eta^2 = .14$), a mixed ANOVA (with time budgeting as the between-subjects factor and store as the within-subjects factor) revealed the predicted effect of time budgeting on goal setting ($F(1, 101) = 9.86$, $p = .002$, $\eta^2 = .09$; see figure 2). Compared to the control ($M = 18.71$, SD = 9.62), participants in the time-first condition set lower total multiple goals ($M = 13.53$, SD = 7.08). In this and subsequent experiments, see WA for full results and analyses for each store.[3]

FIGURE 2: BUDGETING TIME FIRST ATTENUATES OPTIMISM BIAS IN MULTIPLE GOAL SETTING

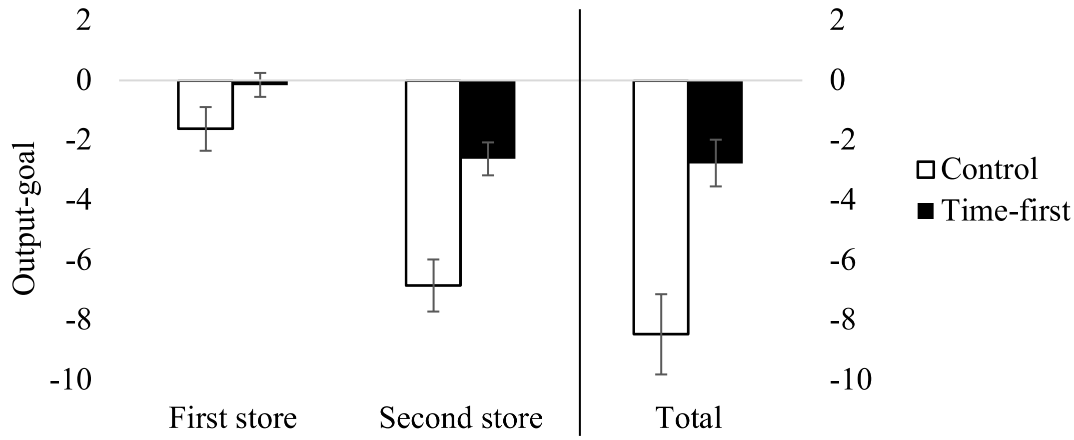


Accuracy. As predicted, budgeting time first made goals more accurate. A mixed ANOVA (with time budgeting as the between-subjects factor and store as the within-subjects factor) revealed the predicted effect of time budgeting on discrepancy (i.e., the difference between goals and output; $F(1, 101) = 14.39$, $p < .001$, $\eta^2 = .12$). Compared to the control (M = -

[3] To further explore how budgeting time first influenced goal setting, we examined the relationship between amount of time allocated to a store and goals set. Regressions revealed a significant positive relationship for Amazon.com ($\beta = .48$, $t(53) = 3.95$, $p < .001$, $R^2_{adj} = .21$) and a marginal positive relationship for Target.com ($\beta = .24$, $t(53) = 1.82$, $p = .074$, $R^2_{adj} = .04$). Consistent with our suggestion that budgeting time first impacts goal setting by encouraging consideration of trade-offs in time use (vs. generally setting lower goals), the more time participants allocated to a task, the higher the goal they set for that task.

8.48, SD = 9.31), participants in the time-first condition demonstrated a significantly smaller gap between goals and output (M = -2.76, SD = 5.78; see figure 3).

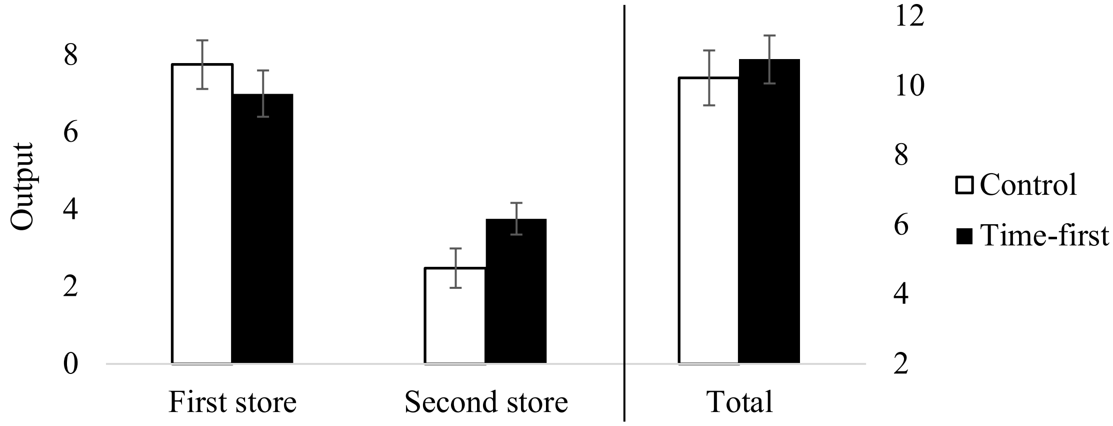
FIGURE 3: BUDGETING TIME FIRST IMPROVES GOAL ACCURACY



Further, consistent with our theory, the effect compounded over sequential goal pursuit (condition × store interaction: $F(1, 101) = 7.50$, $p = .007$, $\eta^2 = .04$). Budgeting time first reduced discrepancy to a greater extent as participants progressed through the stores.

Output. Importantly, this reduced discrepancy was driven by setting less overly optimistic goals, not by doing less on the tasks. A mixed ANOVA (with time budgeting as the between-subjects factor and store as the within-subjects factor) revealed a significant effect of store on total shopping output ($F(1, 101) = 57.17$, $p < .001$, $\eta^2 = .35$), but importantly, no effect of time budgeting ($F < 1$; see figure 4). Participants in the time-first condition selected just as many products total (i.e., across stores; M = 10.76, SD = 5.09) as those in the control (M = 10.23, SD = 5.45).

FIGURE 4: BUDGETING TIME FIRST DOES NOT REDUCE TOTAL OUTPUT



Moreover, the (marginally) significant condition × store interaction ($F(1, 101) = 3.27$, p = .074, $\eta^2 = .02$) shows that budgeting time first increased output on later goals (i.e., the second store in the sequence). Although output on the first store did not differ (p = .389), on the second store, participants in the time-first condition put more products in their basket (p = .050). Consistent with our theory, reducing optimism bias in multiple goal setting helped protect time for downstream goal(s), boosting subsequent performance. In this and subsequent experiments, see WA for full results and analyses for each task.

Discussion

Experiment 1 provides initial evidence that putting time first when setting multiple goals increases multiple goal achievement. In a real, incentive-compatible online shopping task, budgeting a fixed amount of total time across multiple stores before setting goals (vs. only setting goals) made people more likely to achieve those multiple goals. When participants budgeted time before setting multiple goals, they achieved a greater number of their shopping goals and were more likely to achieve all (both) goals.

Further, budgeting time first increased multiple goal achievement by reducing optimism bias in multiple goal setting. When people budgeted time before setting goals, they set less overly optimistic (i.e., lower) multiple goals.

Finally, budgeting time first made goals more accurate, without undermining overall performance. Budgeting time first reduced the discrepancy between goals and output (i.e., the difference between participants' shopping goals and the number of products they put in their baskets); an effect that grew stronger with sequential task progression. Importantly, this reduced discrepancy was driven by setting less overly optimistic goals (i.e., a difference in goal setting), not by accomplishing less on the tasks (i.e., a difference in output). Time-first participants accomplished just as much in total (i.e., put just as many products in their shopping baskets) as those in the control, and performed even better on the second store.

Note that, even in the time-first condition, overall discrepancy was negative. Consistent with our suggestion that budgeting time first reduces—but does not eliminate—optimism bias in multiple goal setting, time-first participants still underperformed (on average) relative to their goals. Thus, goal setting in the time-first condition was still optimistic—just less *overly* optimistic—and more in line with what could actually be achieved within the available time.

EXPERIMENT 2: MORE GOALS AND DIFFERENT TASKS

Experiment 2 tests our predictions with a larger number of goals and three novel, distinct tasks (geography, spelling, and math quizzes). All participants had the same total amount of time to spend on the three tasks, and we manipulated whether they budgeted time before setting goals (i.e., for how many correct answers to get on each). We predicted that budgeting time first would increase multiple goal achievement by reducing optimism bias in multiple goal setting, such that people would set more accurate multiple goals, without reducing total output.

In addition, to ensure that participants indeed perceive that they have multiple distinct goals, experiment 2 measures perceptions of multiple goal pursuit.

Finally, it provides a preliminary test of downstream implications for well-being.

Design and method

Participants. One hundred fifty-four university lab panelists participated in exchange for a small payment and the chance to win one of two $45 bonuses, based on performance. Four participants were excluded for restarting the survey after seeing the task practice section, leaving a final sample of $N = 150$ (average age = 25.4 years, 64.0% women). Participants were randomly assigned to one of two conditions: control versus time-first.

Procedure. The procedure was similar to experiment 1, adapted for this new paradigm. First, participants read detailed instructions (see Appendix) and completed practice tasks. All participants had a total of 7 minutes to spend on three tasks: “spatial reasoning” (identify the U.S. state shown in an image), “verbal reasoning” (identify the misspelled word), and “logical reasoning” (identify two numbers that equal 10). The tasks all consisted of multiple-choice problems with four response options; see WA for stimuli. The minimum requirement was to provide at least 10 correct answers on each task (maximum of 65), and participants received 1 bonus lottery ticket for every 10 points earned (see Appendix for full scoring details). Thus, the lottery was open to participants earning even modest scores (rather than only top performers).

Second, all participants set goals for how many correct answers to achieve on each task, and we manipulated whether they budgeted time first (vs. did not).

Third, all participants spent 7 minutes pursuing their goals (presented in random order), and we measured task output and multiple goal achievement.

Fourth, we measured perceptions of multiple goal pursuit. Because all three task goals ultimately contributed toward the same overarching goal (i.e., to maximize total performance), one could wonder if people indeed thought they had multiple distinct goals. To confirm perceptions of multiple goal pursuit, we asked participants, "While working on the tasks, how many goals did you have?" (open-response). Supporting our operationalization, three goals was the most frequent open-ended response (76.7% of all answers), and the average did not differ from three (M = 3.04 goals, SD = 1.10; t-test vs. 3, t<1), nor by condition (F<1).[4]

Fifth, to begin to explore downstream implications for well-being, we asked participants, "How happy are you with your overall performance on the tasks?" (same response scale).

Sixth, as in experiment 1, we confirmed that the task incentive (win one of the $45 bonuses) was motivating to participants (M = 5.95, SD = 1.49; t-test vs. scale mid-point (4); $t(149) = 16.01$, $p < .001$), and did not differ by condition ($F < 1$).

Finally, to confirm the content of the tasks was perceived as equally challenging across conditions, we measured perceived task difficulty with three measures: "How easy or difficult were the tasks? Spatial Reasoning, Verbal Reasoning, Logical Reasoning" (1 = *Very easy*, 4 = *Neither difficult nor easy*, 7 = *Very difficult*). Results confirmed that the tasks were perceived as moderately challenging overall, and this did not differ by condition ($M_{geography}$ = 4.21, SD = 2.05, $M_{spelling}$ = 3.53, SD = 1.75, M_{math} = 3.47, SD = 1.68; F's < 1).

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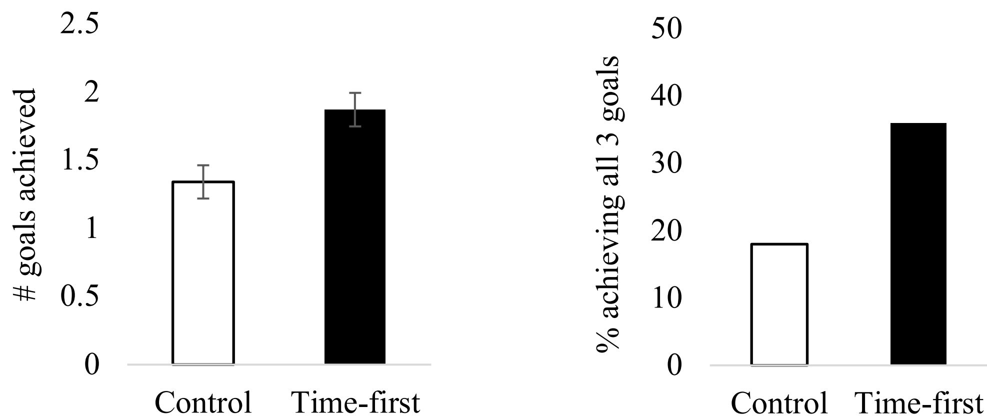
[4] Following Weingarten et al. (2018), we also measured happiness with performance on each task (1 = *Very unhappy*, 4 = *Neither happy nor unhappy*, 7 = *Very happy*). Three ANOVAs using task goal achievement as a predictor of happiness with task performance further revealed significant relationships for each matched pair (Geography: $F(1, 148) = 25.78$, $p < .001$, $\eta^2 = .15$; Spelling: $F(1, 148) = 37.06$, $p < .001$, $\eta^2 = .20$; Math: $F(1, 148) = 41.38$, $p < .001$, $\eta^2 = .22$). Relationships for non-matched pairs were non-significant or weaker (see WA).

Results

Multiple goal achievement. As predicted and consistent with experiment 1, budgeting time before setting goals increased the number of goals achieved (one-way ANOVA: $F(1, 148) = 9.34$, $p = .003$, $\eta^2 = .06$). Compared to the control ($M = 1.34$, SD = 1.05), people in the time-first condition achieved significantly more of their goals ($M = 1.87$, SD = 1.08; see figure 5 left side).

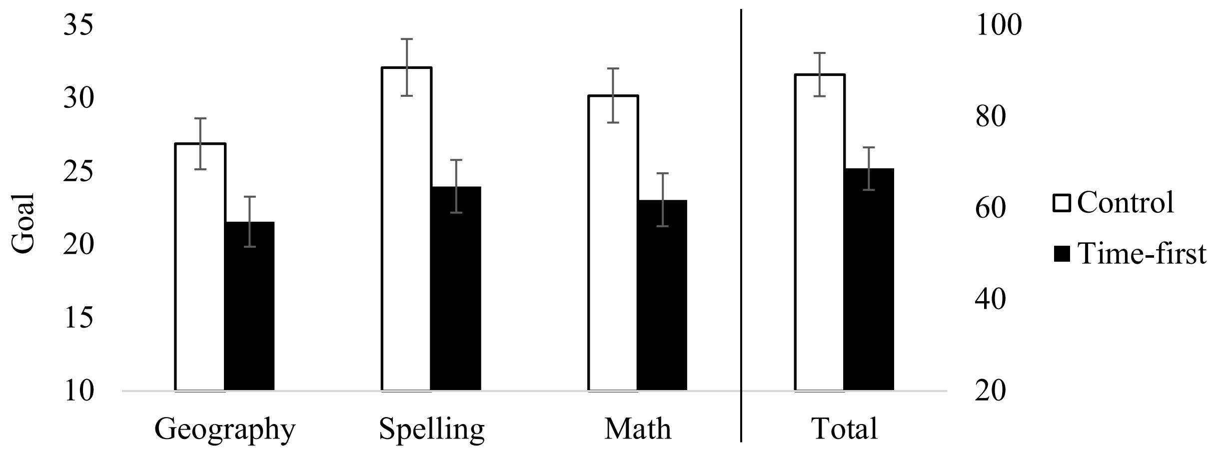
Further, budgeting time first made participants more likely to achieve *all* of their multiple goals (logistic regression: $b = .62$, Wald $\chi^2(1) = 5.99$, $p = .014$, OR = 2.59). Compared to the control (18%), participants in the time-first condition were more likely to achieve all three of their goals (36%; see figure 5 right side).

FIGURE 5: BUDGETING TIME FIRST INCREASES MULTIPLE GOAL ACHIEVEMENT



Optimism bias in goal setting. As predicted, budgeting time first reduced optimism bias in multiple goal setting. Consistent with experiment 1, in addition to an effect of quiz (i.e., the first vs. second vs. third quiz in the sequence; $F(2, 296) = 5.99$, $p = .003$, $\eta^2 = .04$), a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed the predicted effect of time budgeting on goal setting ($F(1, 148) = 9.62$, $p = .002$, $\eta^2 = .06$; see figure 6). Compared to the control ($M = 89.19$, SD = 40.69), participants in the time-first condition set lower multiple goals ($M = 68.62$, SD = 40.52).

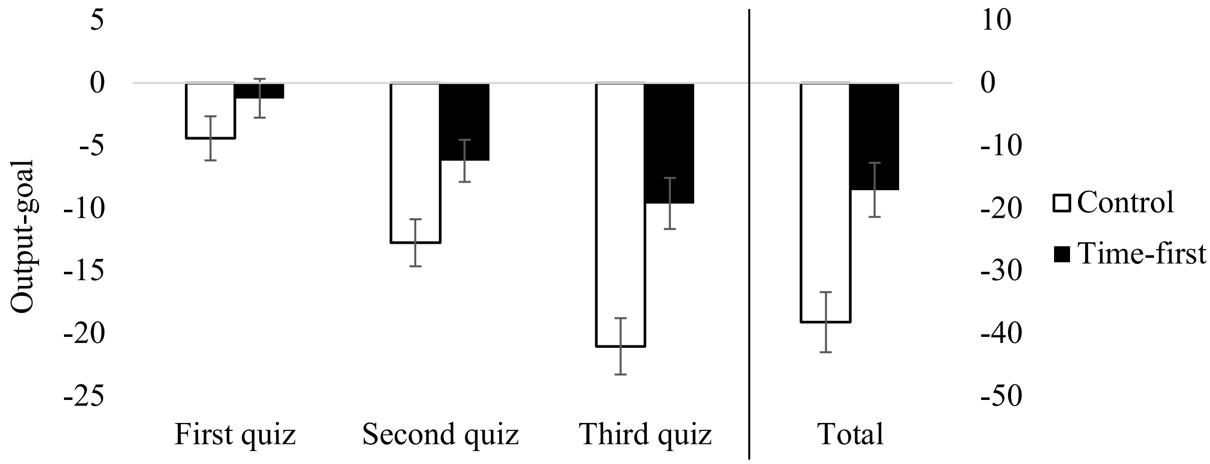
FIGURE 6: BUDGETING TIME FIRST ATTENUATES OPTIMISM BIAS IN MULTIPLE GOAL SETTING



Accuracy. As predicted, budgeting time first caused people to set goals that were more accurate. Consistent with experiment 1, in addition to an effect of quiz (F(2, 296) = 43.68, p < .001, η^2 = .22) a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed the predicted effect of time budgeting on discrepancy (F(1, 148) = 10.73, p = .001, η^2 = .07). Compared to the control (M = -38.20, SD = 41.32), participants in the time-first condition showed a smaller gap between goals and output (M = -17.07, SD = 37.66; see figure 7).

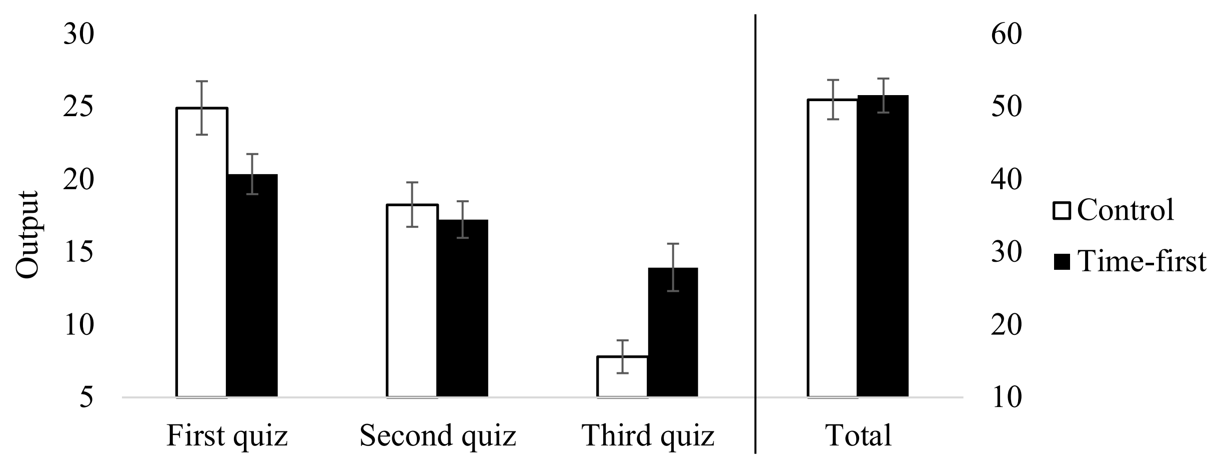
Further, this compounded over sequential goal pursuit (interaction: F(2, 296) = 4.76, p = .009, η^2 = .02), with budgeting time first reducing discrepancy to a greater extent as people progressed through the tasks. That overall discrepancy was negative in the time-first condition underscores that goals were still optimistic and challenging, but more achievable.

FIGURE 7: BUDGETING TIME FIRST INCREASES GOAL ACCURACY



Output. Importantly, as predicted, this reduced discrepancy was not due to time budgeting causing people to do less on the tasks. Consistent with experiment 1, a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed a significant effect of quiz on total output ($F(2, 296) = 31.52$, $p < .001$, $\eta^2 = .17$), but no effect of time budgeting ($F < 1$; see figure 8). Participants in the time-first condition provided just as many correct answers total ($M = 51.55$, SD = 20.36) as those in the control ($M = 50.99$, SD = 23.34).

FIGURE 8: BUDGETING TIME FIRST DOES NOT REDUCE TOTAL OUTPUT



Moreover, the significant interaction ($F(2, 296) = 6.70$, $p = .001$, $\eta^2 = .04$) revealed that participants in the time-first (vs. control) condition got fewer correct answers on the first quiz ($p = .049$), but significantly more on the third quiz ($p = .002$). By reducing optimism bias in multiple goal setting, budgeting time first can thus help protect time for downstream goal(s), boosting subsequent performance.

Subjective well-being. Providing initial support for the downstream benefits of budgeting time first for well-being, a mediation analysis revealed a significant indirect effect of number of goals achieved on overall happiness (*ab* = .42, 95% CI, .15 to .72; Hayes 2018). By increasing multiple goal achievement, budgeting time first boosted overall happiness with performance. In this and subsequent experiments, see WA for means and direct effects for all well-being measures.

Discussion

Experiment 2 provides further support for our predictions in a novel paradigm with a greater number of goals and three new, distinct tasks (geography, spelling, and math quizzes). First, budgeting a fixed amount of total time across multiple tasks before setting goals (vs. only setting goals) increased multiple goal achievement. Time-first participants achieved a greater number of goals and were more likely to achieve all goals.

Second, as predicted and consistent with experiment 1, this increase in multiple goal achievement occurred because budgeting time first reduced optimism bias in multiple goal setting. Time-first participants set less overly optimistic (i.e., lower) multiple goals.

Third, budgeting time first encouraged people to set goals that were more accurate, without diminishing overall performance. Time-first participants showed a smaller discrepancy between goals and output, and the difference (vs. control) grew more pronounced with sequential task progression. Importantly, supporting our theory, this reduced discrepancy was due to setting less overly optimistic goals, not by accomplishing less on the tasks. Consistent with experiment 1, time-first participants got just as many correct answers total as those in the control (and even performed better on the last quiz). Budgeting time before setting goals thus enabled participants to better align their goals with their efforts (i.e., achieve more goals with the same total performance), without reducing how much they did overall.

Fourth, experiment 2 provides preliminary evidence that budgeting time before setting goals has downstream benefits for well-being. By increasing multiple goal achievement, budgeting time first boosted overall happiness with task performance.

EXPERIMENT 3: TIME-FIRST VS. GOALS-FIRST

Experiment 3 further tests our theory by manipulating when time budgeting occurred. One could wonder if, rather than reducing optimism bias in goal setting (as we suggest), the benefits of allocating time for multiple goal pursuit just follow from planning for time use (in general). To test this, in experiment 3 we added a new condition in which participants also budget time but do so *after* goal setting. If the benefits of time budgeting are due to planning for time use, in general, then allocating time after setting goals (i.e., putting “goals-first”) should similarly increase multiple goal achievement. However, if the benefits of time budgeting are driven by reducing optimism bias in multiple goal setting, as we suggest, then allocating time after goal setting should not have the same effects.

Design and method

Participants. Three hundred thirty-two U.S. Amazon Mechanical Turk panelists participated in exchange for a small payment and the chance to win a $100 bonus, based on task performance. In this and all online experiments, we targeted a sample size of 100 participants per experimental condition, net any exclusions. Twelve participants were excluded for restarting the survey after progressing to the practice tasks, five failed an attention check question, and 21 were excluded for extreme values of total time spent on the survey,[5] leaving a final sample of $N = 298$ (average age = 34.9 years, 53.7% women). Participants were randomly assigned to one of three conditions: control versus time-first versus goals-first.

Procedure. The procedure was the same as in experiment 2, with three exceptions. First, tasks were presented in the same fixed (and known) order for all participants (geography, spelling, and then math quizzes).[6] While randomizing task order in prior experiments enabled us to exclude the possibility that task order influenced the effects, one could wonder if the benefits of budgeting time first might be reduced if participants are aware of (and thus can plan for) task order when setting their goals. To show that the effects are robust in this case, in experiment 3 we used the same fixed task order for all participants.

Second, the task incentive structure was the same as in experiment 1, with participants scoring in the top 20% being entered into the bonus lottery.

Third, in the (new) goals-first condition, participants first set goals and then allocated time to each task (while also viewing their goals; see WA for stimuli).

Results

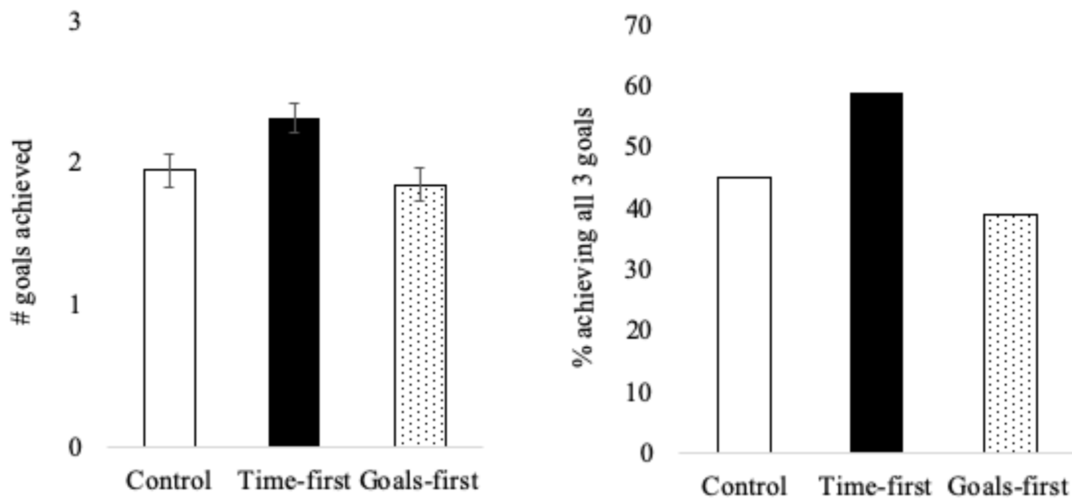
Multiple goal achievement. As expected, budgeting time before (but not after) setting multiple goals increased the number of goals achieved ($F(2, 295) = 5.01$, $p = .007$, $\eta^2 = .03$; see

[5] Given the detailed instructions and timed experimental design, for all online experiments we employed exclusions for failing an attention check and for extreme values on time spent on the study. Time outliers were time values +/- 2.5 standard deviations from the mean, calculated in two waves (following Meyvis and Van Osselaer 2017).
[6] To confirm the content of the tasks was perceived as equally challenging across conditions in this new participant population, we measured perceived task difficulty with the same measures from experiment 2. Results confirmed that the tasks were perceived as moderately challenging overall, and this did not differ by condition ($M_{\text{geography}} = 3.76$, SD = 1.88, $M_{\text{spelling}} = 2.92$, SD = 1.75, $M_{\text{math}} = 3.66$, SD = 1.77; p's > .130).

figure 9 left side). Consistent with the prior results, compared to the control (*M* = 1.95, SD = 1.16), time-first participants achieved significantly more of their goals (*M* = 2.32, SD = .98; $F(1, 295) = 5.54$, $p = .019$, $\eta^2 = .02$).

Importantly, time-first participants also achieved more of their goals than those in the goals-first condition (*M* = 1.85, SD = 1.16; $F(1, 295) = 9.02$, $p = .003$, $\eta^2 = .03$), which did not differ from control ($F < 1$). Supporting our theory, because only budgeting time first could influence multiple goal setting, only budgeting time first increased multiple goal achievement.

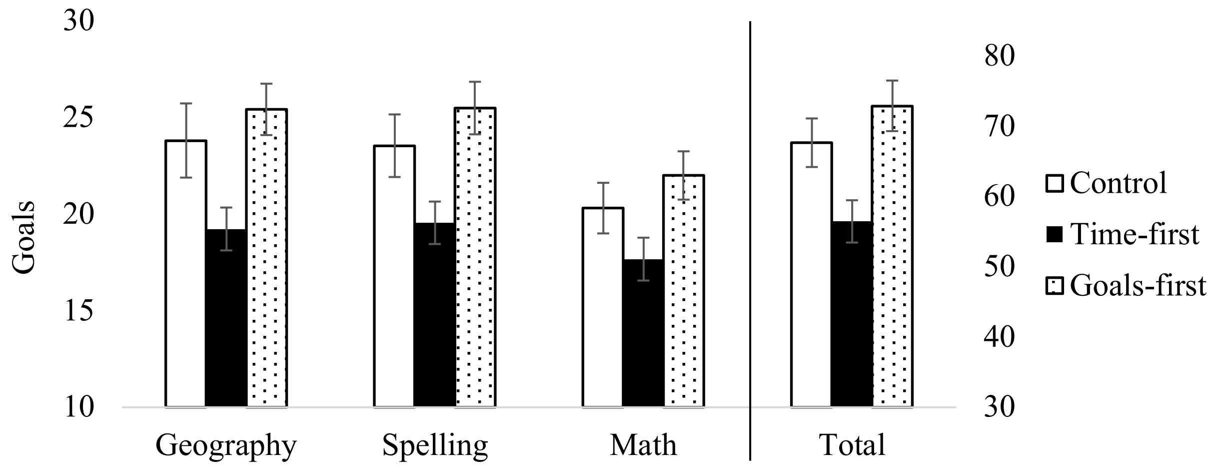
FIGURE 9: BUDGETING TIME FIRST (NOT SECOND) INCREASES MULTIPLE GOAL ACHIEVEMENT



Similar results emerged on the likelihood of achieving all goals. Time-first participants were more likely to achieve all of their goals (59%) compared to the control (45%; $b = .56$, Wald $\chi^2(1) = 3.88$, $p = .049$, OR = 1.76) and to the goals-first condition (59%; $b = .84$, Wald $\chi^2(1) = 8.35$, $p = .004$, OR = 2.31), which did not differ from control ($b = -.27$, $\chi^2 < 1$; see figure 9 right side).

Optimism bias in goal setting. Supporting our theory, budgeting time before (but not after) setting goals reduced optimism bias in multiple goal setting. In addition to an effect of quiz ($F(2, 590) = 18.82$, $p < .001$, $\eta^2 = .06$), a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed the predicted effect of time budgeting on goal setting (F(2, 295) = 6.28, p = .002, η^2 = .04; see figure 10). As in the prior results, compared to the control (M = 67.66, SD = 34.46), time-first participants set lower multiple goals (M = 56.46, SD = 30.28; F(1, 295) = 5.58, p = .019, η^2 = .02).

FIGURE 10: BUDGETING TIME FIRST (NOT SECOND) ATTENUATES OPTIMISM BIAS IN MULTIPLE GOAL SETTING

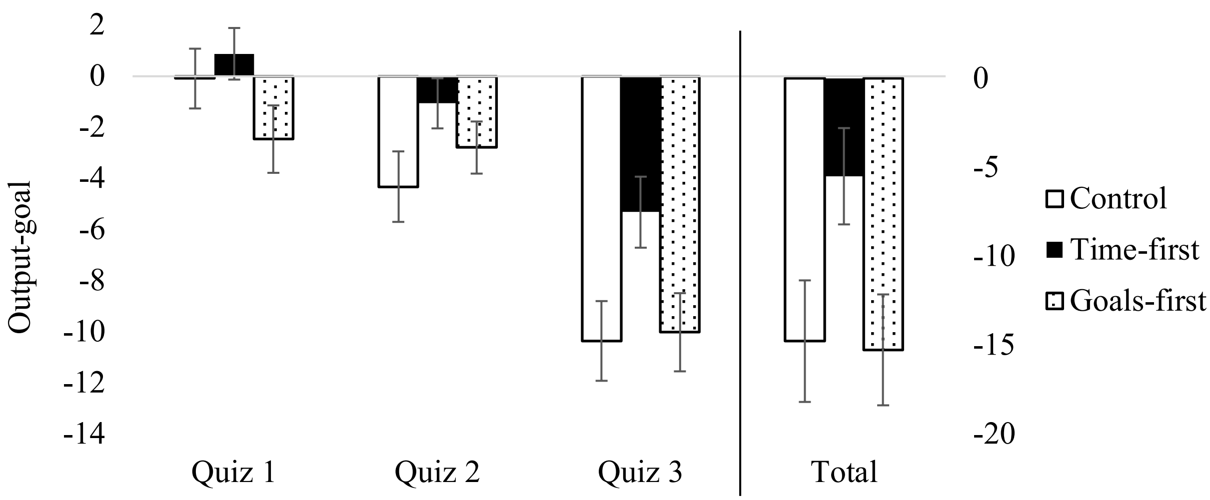


Importantly, time-first participants also set lower goals than those in the goals-first condition (M = 72.91, SD = 35.65; F(1, 295) = 11.99, p = .001, η^2 = .04), which did not differ from control (F(1, 295) = 1.21, p = .272). Consistent with our argument that considering time trade-offs *during* goal setting is what encourages consumers to set less overly optimistic multiple goals, only budgeting time before setting goals reduced optimism bias in multiple goal setting.

Accuracy. Consistent with the prior experiments, budgeting time first increased goal accuracy. In addition to an effect of quiz (F(2, 590) = 59.55, p < .001, η^2 = .17), a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed the predicted effect of time budgeting on discrepancy (F(2, 295) = 3.20, p = .042, η^2 = .02; see figure 11). Compared to the control (M = -14.78, SD = 34.02), time-first participants experienced a significantly smaller gap between goals and output (M = -5.50, SD =

27.22; $F(1, 295) = 4.54$, $p = .034$, $\eta^2 = .02$), and this difference increased over sequential goal pursuit (condition × task interaction: ($F(4, 590) = 2.00$, $p = .093$, $\eta^2 = .01$).

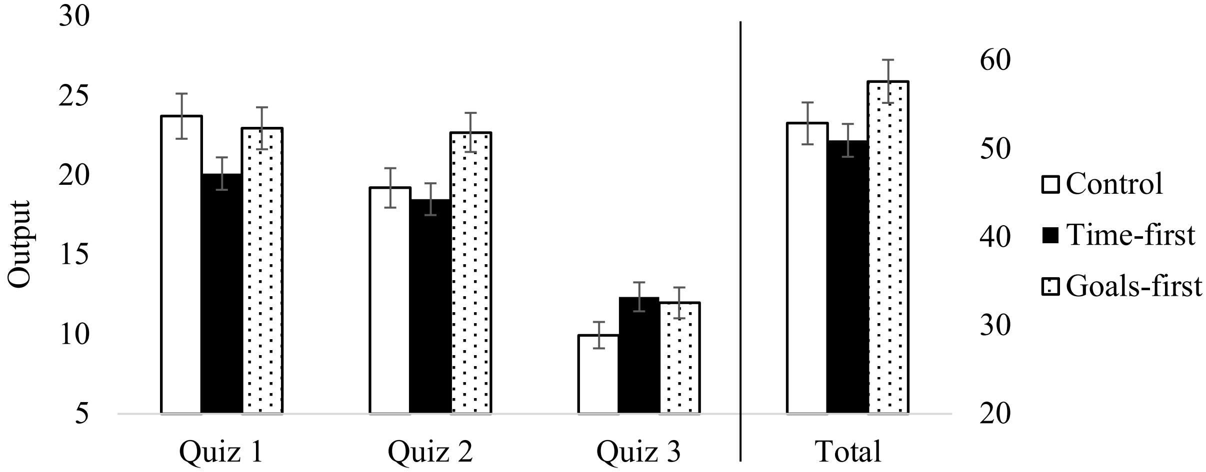
FIGURE 11: BUDGETING TIME FIRST (NOT SECOND) FIRST INCREASES GOAL ACCURACY



Importantly, time-first participants also realized a smaller discrepancy versus the goals-first condition ($M = -15.27$, SD = 30.84; $F(1, 295) = 5.01$, $p = .026$, $\eta^2 = .02$), which did not differ from control ($F < 1$).

Output. In addition to an effect of quiz ($F(2, 590) = 94.87$, $p < .001$, $\eta^2 = .24$), a mixed ANOVA (with time budgeting as the between-subjects factor and quiz as the within-subjects factor) revealed a marginal effect of time budgeting on total output ($F(2, 295) = 2.37$, $p = .096$, $\eta^2 = .02$; see figure 12), qualified by a significant interaction ($F(4, 590) = 3.09$, $p = .016$, $\eta^2 = .02$). Consistent with the prior results, compared to the control ($M = 52.88$, SD = 23.59), time-first participants provided just as many correct answers total ($M = 50.96$, SD = 18.70; $F<1$); providing fewer on the first quiz ($p = .043$) and more on the third ($p = .060$).

FIGURE 12: BUDGETING TIME FIRST DOES NOT REDUCE TOTAL OUTPUT



The marginal main effect of time budgeting was driven by the goals-first condition, which increased output relative to the time-first condition (M = 57.64, SD = 24.20; $F(1, 295)$ = 4.48, p = .035, η^2 = .01) and (directionally) relative to the control ($F(1, 295)$ = 2.25, p = .134, η^2 = .01). This suggests that time budgeting after goal setting could potentially boost output (although at least here, not enough to increase multiple goal achievement), which future work could explore.

Discussion

Experiment 3 informs why budgeting time first increases multiple goal achievement. Replicating the previous experiments, budgeting time before setting goals encouraged people to set less overly optimistic multiple goals that they were more likely to (all) achieve. Budgeting time after setting goals, however, did not produce the same benefits. Supporting our theory that time budgeting increases multiple achievement by attenuating optimism bias in multiple goal setting (rather than through planning for time use in general), allocating time only increased multiple goal achievement when it proceeded (and thus could influence) goal setting.

Further, consistent with prior experiments, goals in the time-first (vs. control) condition were more accurate without being less motivating. Time-first participants provided just as many correct answers overall as those in the control (and did even better on the third task). Because their goals were less overly optimistic, the same total performance achieved more of their goals.

Given that people in the goals-first condition explicitly considered their goals and the time available to pursue each (which could increase trade-off consideration), one could wonder if, given the opportunity, they would have revised their goals.

To test this, we ran a follow-up study (MTurk, $N = 297$; goal setting only) replicating the design of experiment 3, except that after budgeting time, participants in the goals-first condition were shown their goals and associated time allocation and asked, "Would you like to change any of your goals before starting the tasks?" (1 = yes, 0 = no). Those who answered "yes" entered their final (revised) goals.[7] Consistent with the main experiment 3, prior to any revision, participants in the goals-first condition set higher goals ($M = 73.60$) than those in the time-first condition ($M = 58.75$; $p = .006$), similar to control ($M = 77.71$; $F < 1$; see WA for full results).

Despite the explicit prompt, only 26% chose to revise their goals (a proportion significantly below chance, $p < .001$). Indeed, these revised goals were lower ($M = 55.35$; vs. control: $p = .007$; vs. time-first: $p = .681$), suggesting that budgeting time after setting goals may make (some) people aware that they were overly optimistic. Notably, goals of the 74% who did not revise remained overly optimistic ($M = 55.35$; vs. time-first: $p = .050$). Thus, even when the relationship between multiple goals and the (limited) time available for each was made salient (and participants made a forced, active choice about revision), the option to revise was underutilized. Whether because it is aversive to revise an existing goal downward, or because

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[7] After advancing past the goal setting section, all participants were told they would not have to actually do the tasks and would be entered in the $100 bonus lottery.

reactive goal revision requires some additional mental effort, budgeting time after setting goals is unlikely to produce the same benefits as putting time first.

EXPERIMENT 4: MERE GOALS AND CHOSEN TASK ORDER

Given our interest in multiple goal achievement, the experiments thus far explicitly incentivized accurate goal setting (i.e., rewards were contingent upon achieving the goal). Thus, one could wonder whether the results hold when rewards accumulate incrementally and goals merely serve as reference points to guide behavior (i.e., "mere goals"; Heath et al. 1999). To test this, in experiment 4 we incentivized incremental output (i.e., each product in the shopping basket earned one point) and had participants set "mere goals" for how many products to shop for in each of two stores. We expected that, even in the absence of contingent rewards, budgeting time first would reduce optimism bias in multiple goal setting, encouraging people to set more accurate multiple goals, boosting multiple goal achievement (without hurting total output).

In addition, one could wonder whether having participants pursue tasks in a random (or fixed) order makes multiple goal achievement less likely (therefore making it easier to show that budgeting time first has a positive effect). To demonstrate robustness, in experiment 4 we manipulated whether participants chose which store to shop in first (vs. randomized store order) and tested whether this moderated the effects. Regardless of whether store order was chosen or assigned, we expected that a time-first approach would increase multiple goal achievement.

Finally, experiment 4 examines downstream implications for subjective well-being. Even lacking explicit incentives, goal achievement has important psychological benefits (e.g., Heath et al. 1999; Weingarten et al. 2018). Accordingly, we predicted that, by increasing multiple goal achievement, budgeting time first would boost subjective well-being.

Design and method

Participants. Two hundred and ninety-four university lab panelists participated in exchange for a small payment and the chance to win some of the products they chose during the task. Eight participants were excluded for restarting the survey after having progressed to the task practice section, leaving a final sample of $N = 286$ (average age 25.08 years, 67.8% women). Participants were randomly assigned to one of four conditions in a 2 (time budgeting: control versus time-first) x 2 (store order: assigned vs. chosen) design.[8]

Procedure. The procedure was the same as in experiment 1 (online shopping), with three exceptions. First, we employed a "mere goals" design in which participants' scores (and thus chances to win their chosen products) did not depend on goal achievement. Participants received one point per product added to their basket, regardless of the goal they set or how it compared to their output. When setting goals, participants were instructed to set desirably high, achievable goals ("set goals for the highest number of products you think you can select from each store").

Second, in the (new) chosen-order condition, after setting goals participants responded to the question, "Which store do you want to shop in first?" (Amazon vs. Target), and then pursued their shopping goals in this order. In the random-order condition, participants were informed (as in experiments 1 and 2) that store order would be random.

Third, after goal pursuit, we measured subjective well-being (i.e., positive and negative affect and feelings of self-efficacy; Bandura and Locke 2003; Heath et al. 1999; Weingarten et al. 2018). To measure positive affect (happy) and negative affect (disappointed), we asked participants, "Please indicate to what extent you feel this way right now" (1 = *Very slightly or not at all*, 3 = *Moderately*, 5 = *Extremely*). To measure self-efficacy, we asked participants,

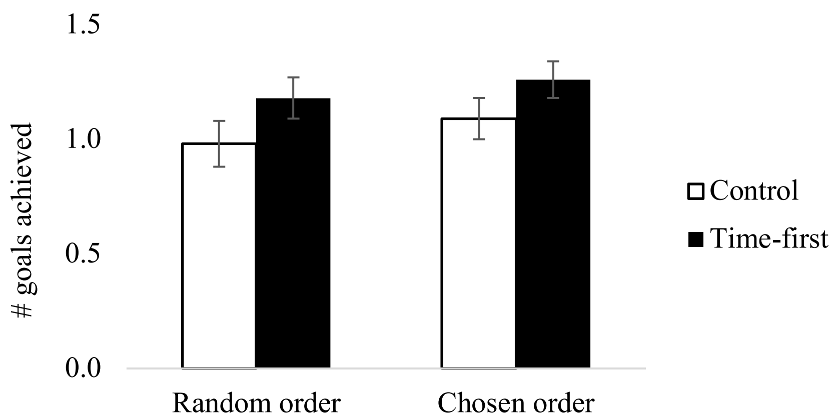
[8] To achieve a sufficient sample size for a 4-cell design, data were collected across two separate lab sessions, with participants from the first session excluded from the second.

"Please rate your competence at shopping online (in general)" (1 = *Not at all competent*, 4 = *Moderately competent*, 7 = *Highly competent*).

Results

Multiple goal achievement. A 2 (time budgeting) × 2 (store order) ANOVA revealed only the predicted effect of time budgeting on number of goals achieved ($F(1, 282) = 4.00$, $p = .047$, $\eta^2 = .01$; see figure 13).[9] As expected, regardless of whether store order was randomly assigned or chosen, budgeting time first increased multiple goal achievement ($M_{\text{time-first}} = 1.23$, SD = .76 vs. $M_{\text{control}} = 1.04$, SD = .79). There was no effect of store order nor interaction (F's < 1).

FIGURE 13: BUDGETING TIME FIRST INCREASES MULTIPLE GOAL ACHIEVEMENT



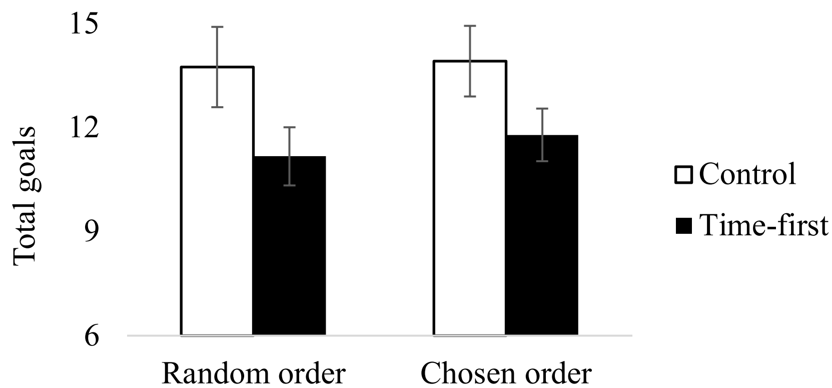
Further, a logistic regression revealed no time budgeting × store order interaction on the likelihood of achieving all goals ($b = .06$, Wald χ^2<1). As expected, regardless of whether store order was assigned or chosen, participants in the time-first condition were (marginally) more likely to achieve both goals ($42\%_{\text{time-first}}$ vs. $33\%_{\text{control}}$; $b = .41$, Wald $\chi^2(1) = 2.83$, $p = .093$).

Optimism bias in goal setting. In addition to an effect of store (i.e., the first or second store visited; $F(1, 286) = 61.93$, $p < .001$, $\eta^2 = .17$) and a store x time budgeting interaction (F(1,

[9] Prior to analyses, a hypothesis-blind research assistant validated participants' responses against the task criteria. Twenty-seven participants provided a total of 60 invalid responses; these were retained but not scored as correct.

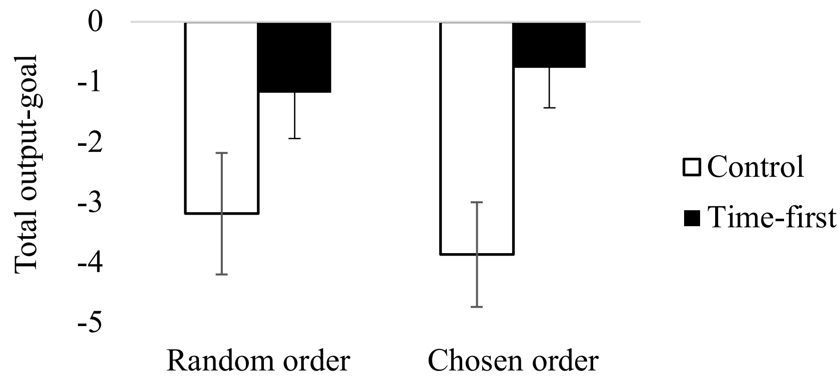
286) = 13.04, $p < .001$, $\eta^2 = .04$), a mixed ANOVA (with time budgeting and store order as between-subjects factors and store as the within-subjects factor) revealed the predicted effect of time budgeting on goal setting ($F(1, 282) = 6.02$, $p = .015$, $\eta^2 = .02$; see figure 14). As expected, regardless of how store order was determined, participants in the time-first condition set lower multiple goals ($M_{\text{time-first}} = 11.54$, SD = 6.80 vs. $M_{\text{control}} = 13.86$, SD = 9.02). There was no effect of store order nor any associated interactions (F's < 1).

FIGURE 14: BUDGETING TIME FIRST ATTENUATES OPTIMISM BIAS IN MULTIPLE GOAL SETTING



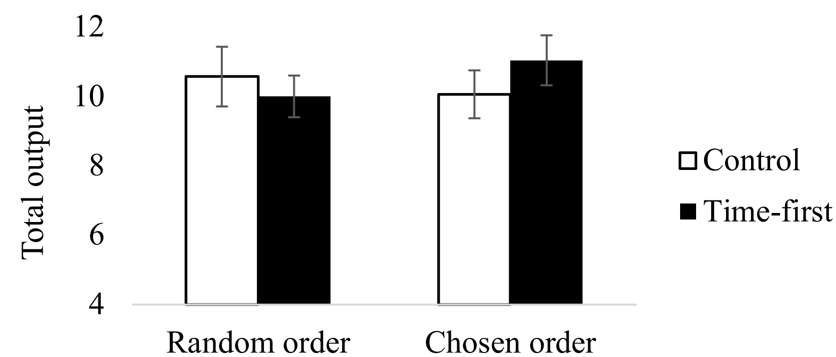
Accuracy. A mixed ANOVA (with time budgeting and store order as between-subjects factors and store as the within-subjects factor) revealed the predicted effect of time budgeting on discrepancy ($F(1, 282) = 9.33$, $p = .002$, $\eta^2 = .03$). As expected, regardless of how store order was determined, participants in the time-first condition demonstrated a smaller gap between goals and output ($M_{\text{time-first}} = -.94$, SD = 6.06 vs. $M_{\text{control}} = -3.59$, SD = 7.77; see figure 15), which compounded over sequential goal pursuit (time budgeting × store interaction: $F(1, 282) = 3.43$, $p = .065$, $\eta^2 = .01$). There was no effect of store order ($F < 1$), nor any associated interactions (p's > .26).

FIGURE 15: BUDGETING TIME FIRST INCREASES GOAL ACCURACY



Output. Consistent with the previous experiments, a mixed ANOVA (with time budgeting and store order as between-subjects factors and store number as the within-subjects factor) revealed a significant effect of store on total shopping output ($F(1, 282) = 13.70$, $p < .001$, $\eta^2 = .05$), but no effect of time budgeting or store order (F's < 1), nor interactions (p's > .27). Regardless of how store order was determined, time-first participants selected just as many products total (i.e., did just as well overall; $M = 10.60$, SD = 5.89) as those in the control ($M = 10.27$, SD = 6.35).[10]

FIGURE 16: BUDGETING TIME FIRST DOES NOT REDUCE TOTAL OUTPUT



Subjective well-being. To examine implications for subjective well-being, we tested the indirect effects of time budgeting on self-efficacy, positive affect, and negative affect via number

[10] In this case, the time budgeting × store interaction was not significant ($p = .607$).

of goals achieved (collapsing across store order condition, which did not impact multiple goal achievement). As predicted, mediation analyses (model 4; Hayes 2018) revealed significant indirect effects of time budgeting on self-efficacy (*ab* = .08, 95% CI, .0014 to .19), as well as positive affect (*ab* = .06, 95% CI, .0004 to .13) and negative affect (*ab* = -.07, 95% CI, -.15 to -.0013). Supporting our theory, by increasing multiple goal achievement, budgeting time first increased self-efficacy, increased positive affect, and decreased negative affect.

Discussion

Even when goal achievement was not explicitly incentivized (i.e., participants set "mere goals"), budgeting time first increased multiple goal achievement. Consistent with the previous results, budgeting time before setting goals encouraged participants to set less overly optimistic multiple goals that they were more likely to (all) achieve. These goals were more accurate without producing a difference in total output across conditions.

Further, the benefits of budgeting time first held regardless of whether store order was chosen or assigned and choosing store order increased neither multiple goal achievement nor total performance. Thus, at least in the present context, budgeting time before setting goals is a more effective approach than deciding how to pursue multiple goals once set.

Finally, experiment 4 demonstrates downstream benefits of time budgeting for subjective well-being. By increasing multiple goal achievement, budgeting time first increased self-efficacy and positive affect, and it decreased negative affect. Notably, this occurred even in the absence of contingent rewards for goal achievement (and without increasing total output), underscoring the importance of promoting goal achievement "per se" for enhancing psychological well-being.

EXPERIMENT 5: UNDERLYING PROCESS

Experiment 5 tests the proposed underlying role of time trade-off consideration in reducing optimism bias in multiple goal setting. As in the prior experiments, participants set multiple goals, and we manipulated whether they budgeted time first. We then measured the extent to which they considered trade-offs in time use between goals during goal setting and tested whether this mediated the effect. We predicted that budgeting time first (vs. only setting goals) would increase consideration of trade-offs in time use, which would encourage participants to set less overly optimistic (lower) multiple goals.

In addition, experiment 5 tests several alternative explanations. First, because the time-first manipulation involves an additional step (i.e., allocating time across goals), one could wonder whether the difference in goal setting is due to greater elaboration on the task. To rule out this possibility, we added a new condition in which the time budget was assigned (vs. chosen). If the benefits of time budgeting are due to increasing elaboration during goal setting, then an assigned time allocation should attenuate the effects. However, if the benefits are due to increasing time trade-off consideration, as we predict, then the effects should hold in this case.

Second, rather than prompting people to consider time trade-offs per se, one could wonder whether allocating time first activates a more general focus on setting goals that are achievable (vs. desirable). While this would not necessarily be inconsistent with our theory (considering trade-offs in time use might indeed prompt general interest in attainability), we measured a general focus on setting achievable (vs. desirable) goals and tested for any effects.

Third, one could wonder whether the effect of budgeting time first is driven by making goal setting more difficult. To address this possibility, we measured goal-setting difficulty and tested for any potential effects.

Design and method

Participants. Three hundred forty-four U.S. Prolific Academic panelists participated in exchange for a small payment and the chance to win a $100 bonus. Six participants were excluded for restarting the survey after progressing to the practice tasks, two failed the attention check, and 19 were excluded for extreme values on time spent, leaving a final sample of $N = 317$ (average age = 32.9 years, 53.9% women). Participants were randomly assigned to one of three conditions: control versus chosen time budget versus assigned time budget.

Procedure. The procedure was the same as in experiment 2 (quizzes), with four exceptions. First, all participants had a total of 5 minutes to spend on two tasks: the spelling quiz and transcription (a new task that involved typing random strings of six alpha-numeric characters; see WA for stimuli).

Second, the scoring followed the same mere goals design from experiment 4 (in which scores were not tied to goal achievement).

Third, in the new assigned time budget condition, participants first viewed a suggested time budget (3 minutes for transcription and 2 minutes for spelling)[11] and then set goals for those tasks (in a randomized order; see WA for stimuli).

Fourth, after goal setting, we measured the proposed underlying process and possible alternative accounts. To measure time trade-off consideration, we asked participants, "While setting each of your goals, to what extent did you consider how the time spent on that goal would take away from the time available for the other goal?" (1 = *Not at all*, 7 = *Very much*). To explore an alternative general focus on attainability (vs. desirability), we also asked, "While

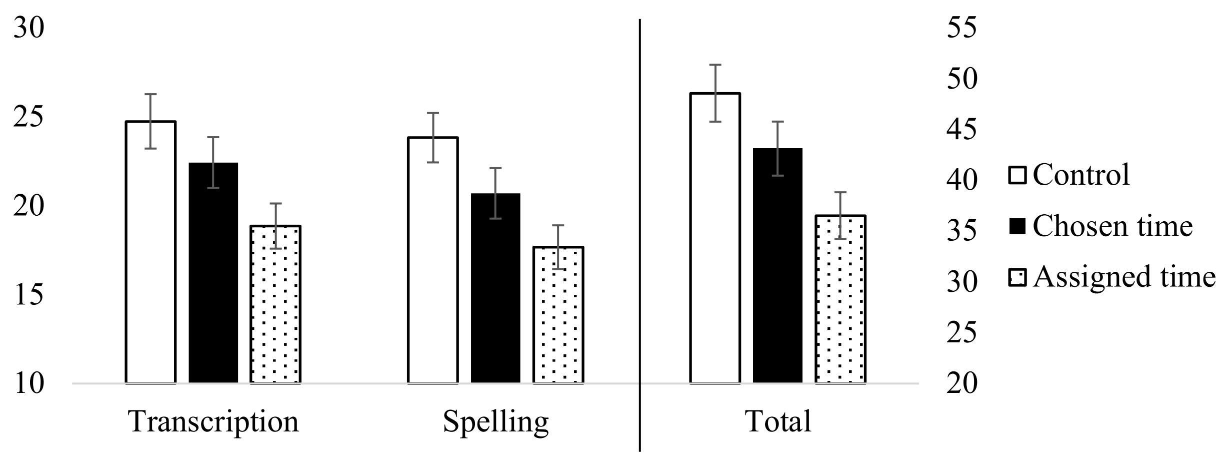
[11] The assigned time budget of 3 and 2 minutes was informed by the previous experiments, in which most participants in the time-first condition chose whole minute, relatively balanced time distributions across tasks. To limit additional complexity, we opted not to randomize which task was assigned 3 vs. 2 minutes.

setting your goals, did you think more about ...” (1 = *How much I could achieve*, 4 = *Both equally*, 7 = *How much I wanted to achieve*). To measure the perceived difficulty of goal setting, we asked “How difficult was it to set your goals?” (1 = *Not at all difficult*, 7 = *Very difficult*).[12]

Results

Optimism bias in goal setting. In addition to an effect of task ($F(1, 314) = 5.44$, $p = .020$, $\eta^2 = .02$), a mixed ANOVA (with time budgeting as the between-subjects factor and task as the within-subjects factor) revealed the predicted effect of time budgeting on goal setting ($F(2, 314) = 5.47$, $p = .005$, $\eta^2 = .03$; see figure 17). Supporting our theory, compared to the control (M = 48.58, SD = 28.93), participants in both time budget conditions set lower multiple goals (albeit, directionally for chosen time; $M_{\text{chosen time}} = 43.13$, SD = 27.04; $M_{\text{assigned time}} = 36.53$, SD = 23.82; chosen time vs. control: $F(1, 314) = 2.19$, $p = .140$, $\eta^2 = .01$; assigned time vs. control: $F(1, 314) = 10.91$, $p = .001$, $\eta^2 = .03$). That assigned time budgets reduced optimism bias in multiple goal setting casts doubt on the possibility that greater elaboration or concreteness alone can explain the findings.

FIGURE 17: ASSIGNED TIME BUDGETS ATTENUATE OPTIMISM BIAS IN MULTIPLE GOAL SETTING



[12] Due to a survey programming error, participants were shown incorrect goals while working on the tasks. Goal performance is thus not interpretable and is not discussed further.

Underlying process. Supporting our theory, budgeting time first increased consideration of time trade-offs during goal setting (one-way ANOVA: $F(2, 314) = 8.90$, $p < .001$, $\eta^2 = .05$). Compared to the control ($M = 3.74$, SD = 1.99), participants in both time budget conditions reported greater consideration of trade-offs in time use between goals while setting their multiple goals ($M_{\text{chosen time}} = 4.83$, SD = 1.65; vs. control: $F(1, 314) = 17.53$, $p < .001$, $\eta^2 = .02$; $M_{\text{assigned time}} = 4.39$, SD = 2.02; vs. control: $F(1, 314) = 6.36$, $p = .012$, $\eta^2 = .01$).[13]

Further, this increased awareness of time trade-offs mediated goal setting. For each time budget condition, a bias-corrected bootstrapping mediation analysis generated a 95% confidence interval around the indirect effect of trade-off consideration that excluded zero (Hayes 2018). As predicted, budgeting time first reduced optimism bias in multiple goal setting by increasing consideration of trade-offs in time use between goals (chosen time vs. control: $ab = -2.21$, 95% CI, -4.54 to -.26; assigned time vs. control: $ab = -1.32$, 95% CI, -3.25 to -.02).

Alternative explanations. As one might plausibly expect, budgeting time first enhanced a general focus on setting achievable (vs. desirable) goals ($M_{\text{control}} = 3.97$, SD = 2.01 vs. $M_{\text{chosen time}} = 3.36$, SD = 1.96 vs. $M_{\text{assigned time}} = 3.68$, SD = 1.96; one-way ANOVA: $F(2, 314) = 2.53$, $p = .082$, $\eta^2 = .02$). However, this only mediated mediate goal setting in the chosen time budget condition (chosen time: $ab = -1.52$, 95% CI, -3.64 to -.11; assigned time: $ab = -.72$, 95% CI, -2.38 to .60).[14] Consistent with our reasoning, although considering time trade-offs might activate

[13] We acknowledge that participants in the assigned time condition set the lowest goals but did not more strongly consider time trade-offs. Given that fewer than half of chosen-time participants allocated 3 minutes to transcription and 2 to spelling (see WA for details), this result is likely due to a mismatch between the assigned time budget and idiosyncratic preferences. Plausibly, a time budget misaligned with one's task-specific preferences could further lower performance expectations and goals, beyond effects of increased consideration of time trade-offs.

[14] A serial mediation model with trade-off consideration predicting consideration of achievability (vs. desirability) revealed significant serial indirect effects for both chosen and assigned time budgeting (chosen time vs. control: $a_1d_{21}b_2 = -.38$, 95% CI, -1.00 to -.04; assigned time vs. control: $a_1d_{21}b_2 = -.23$, 95% CI, -.67 to -.01). A serial mediation model with the reverse order did not reveal significant serial indirect effects (chosen time vs. control: $a_1d_{21}b_2 = -.14$, 95% CI, -.48 to .01; assigned time vs. control: $a_1d_{21}b_2 = -.07$, 95% CI, -.30 to .06).

a general interest in setting attainable (vs. desirable) goals, increased consideration of time trade-offs during goal setting offers the most parsimonious explanation for the effects.

Casting doubt on the notion that budgeting time first lowers goals by increasing goal setting difficulty, there was no effect of time budget condition on the perceived difficulty of setting goals (M_{control} = 3.91, SD = 1.87 vs. $M_{\text{chosen time}}$ = 3.86, SD = 1.79 vs. $M_{\text{assigned time}}$ = 4.14, SD = 1.74; $F < 1$).

Discussion

Experiment 5 provides further evidence that budgeting time first reduces optimism bias in multiple goal setting and demonstrates the underlying role of time-tradeoff consideration. Budgeting time before setting goals prompted greater consideration of trade-offs in time use between multiple goals, leading participants to set lower multiple goals. Thus, by encouraging people to consider how the time spent on one goal affects the time available for other goals, budgeting time first reduces optimism bias in multiple goal setting.

In addition, experiment 5 casts doubt on several alternative explanations. First, that the results held when a time budget was assigned (vs. chosen) underscores that it is separately considering the time available for each goal that prompts trade-off consideration, rather than simply elaborating on or thinking more concretely about the goal setting task itself. Second, although budgeting time first did shift focus toward setting achievable (vs. desirable) goals in general, this was caused by considering time trade-offs to a greater extent (rather than the other way around). Third, budgeting time first did not affect the perceived difficulty of goal setting, casting doubt on the possibility that this might explain the results. Altogether, time trade-off consideration offered the most consistent and parsimonious explanation for the effects.

Notably, that an assigned time budget produced similar benefits (including for multiple goal achievement)[15] suggests that consumers (and marketers) may be able to shape what goals other people set (and ultimately achieve) by recommending how to structure their time. Time budgeting may be a useful tool to help manage consumer expectations and facilitate interdependent goal pursuit. We return to this point in the General Discussion.

EXPERIMENT 6: MULTIPLE VERSUS SINGLE GOALS

Our final experiment further tests the proposed role of time trade-off consideration in two ways. First, we manipulated whether participants had multiple goals (vs. a single goal) and tested for moderation. If increasing consideration of time trade-offs plays the underlying role we suggest, then only when budgeting time first increases time trade-off consideration should it reduce optimism bias in multiple goal setting (and increase multiple goal achievement). To explore this reasoning, we varied the number of tasks participants set goals for (one, two, or three). Because only when setting multiple goals can budgeting time first increase trade-off consideration, only for multiple goals did we expect that budgeting time first would encourage people to set more accurate goals that they would be more likely to (all) achieve.

Second, as in experiment 5, we measured consideration of time trade-offs during goal setting and tested for mediation.

In addition, experiment 6 further examined downstream implications of budgeting time first for subjective well-being (self-efficacy and positive and negative affect).

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[15] A follow-up study (MTurk, $N = 280$) with 3 goals and 9 minutes confirmed that assigned time budgeting can increase multiple goal achievement (number goals achieved: $M_{\text{control}} = 1.76$, SD = 1.16 vs. $M_{\text{assigned time}} = 2.07$, SD = 1.04; $F(1, 278) = 5.77$, $p = .017$, $\eta^2 = .02$; achievement of all goals: $38\%_{\text{control}}$ vs. $47\%_{\text{assigned time}}$; $b = .39$, Wald $\chi^2(1) = 2.61$, $p = .106$, OR = 1.48). See WA for full results.

Design and method

Six hundred forty-eight U.S. Prolific Academic panelists participated in exchange for a small payment and the chance to win a $100 bonus, based on performance. Fourteen participants were excluded for restarting the survey after progressing to the practice tasks, one failed an attention check, and twenty-nine were excluded as extreme values for time spent on the survey, leaving a final sample of $N = 604$ (average age = 33.9 years, 50.2% men). Participants were randomly assigned to one of six conditions in a 3 (number of goals: 1, 2, 3) x 2 (time budgeting: control versus time-first) design.

Procedure. The procedure was the same as in experiment 2, with three exceptions. First, we varied the number of goals. Participants were randomly assigned to set goals for one, two, or three tasks. Participants in the one-goal condition did transcription, those in the two-goal condition did transcription and spelling, and those in the three-goal condition did transcription, spelling, and math. All participants had 6 minutes total to pursue their goal(s), but the number of goals they set and pursued in that time differed across conditions.

Second, after goal pursuit, we measured subjective well-being. To measure self-efficacy, we asked participants, "Please rate your overall competence in the survey tasks (1 = *Not at all competent*, 4 = *Moderately competent*, 7 = *Extremely competent*). To measure positive affect (happy, satisfied, and proud; $\alpha = .91$) and negative affect (upset, frustrated, disappointed; $\alpha = .89$), we asked participants, "Please indicate to what extent you feel this way right now" (1 = *Very slightly or not at all*, 3 = *Moderately*, 5 = *Extremely*).

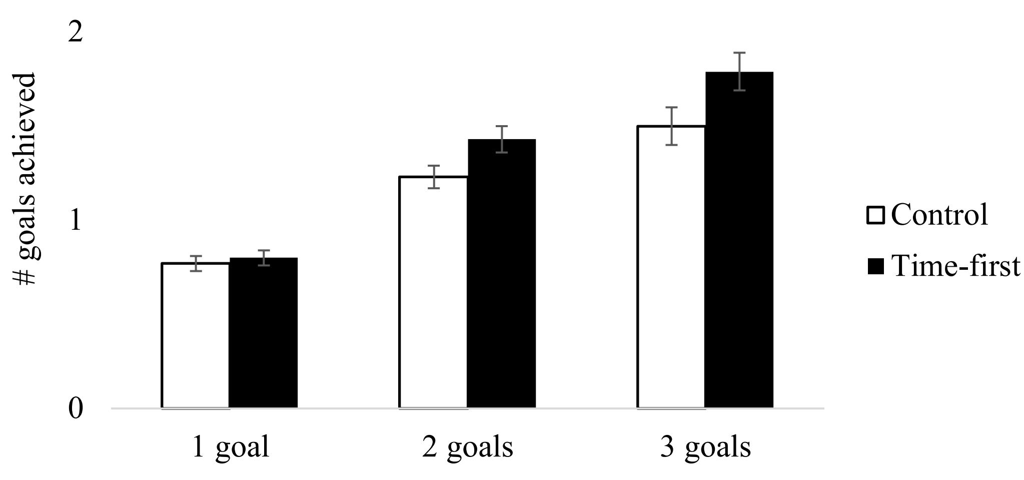
Third, we measured time trade-off consideration by asking participants (in the multiple goal conditions only) the same question from experiment 5.

Results

Multiple goal achievement. In addition to an effect of number of goals ($F(2, 598) = 74.47$, $p < .001$, $\eta^2 = .20$), a two-way ANOVA revealed a main effect of time budgeting on number of goals achieved ($M_{\text{control}} = 1.16$, SD = .79 vs. $M_{\text{time-first}} = 1.32$, SD = .81; $F(1, 598) = 8.54$, $p = .004$, $\eta^2 = .01$; see figure 18). Consistent with the prior results, budgeting time first increased goal achievement when participants had two goals ($M_{\text{control}} = 1.23$, SD = .65 vs. $M_{\text{time-first}} = 1.43$, SD = .65, $F(1, 598) = 3.86$, $p = .050$, $\eta^2 = .01$) and when they had three goals ($M_{\text{control}} = 1.50$, SD = 1.00 vs. $M_{\text{time-first}} = 1.79$, SD = .98, $F(1, 598) = 7.85$, $p = .005$, $\eta^2 = .01$).

Notably, although the number of goals × time budgeting interaction did not reach significance ($F(2, 598) = 1.77$, $p = .171$),[16] when participants had just one goal, time budgeting did not boost goal achievement ($M_{\text{control}} = .77$, SD = .42 vs. $M_{\text{time-first}} = .80$, SD = .40, $F(1, 598) = .06$, $p = .804$). Thus, as expected, budgeting time first only increased goal achievement when participants set and pursued multiple goals (vs. a single goal).

FIGURE 18: BUDGETING TIME FIRST INCREASES MULTIPLE (BUT NOT SINGLE) GOAL ACHIEVEMENT

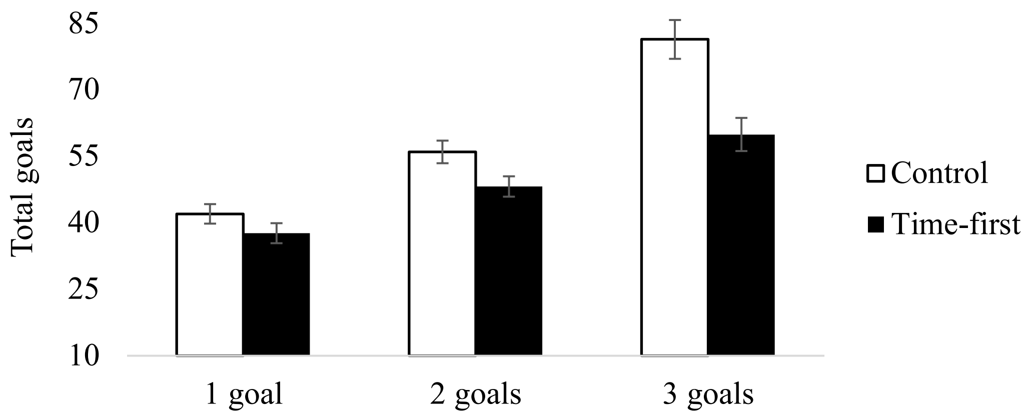


[16] Collapsing across the 2- and 3-goal conditions, the interaction is marginal ($F(1, 600) = 2.75$, $p = .098$).

Similar results emerged for proportion of goals achieved. Budgeting time first increased the proportion of goals achieved when participants had two goals ($M_{control}$ = .61, SD = .32 vs. $M_{time\text{-}first}$ = .71, SD = .33, $F(1, 598) = 3.84$, $p = .051$, $\eta^2 = .01$) and three goals ($M_{control}$ = .50, SD = .33 vs. $M_{time\text{-}first}$ = .60, SD = .33, $F(1, 598) = 3.4$, $p = .063$, $\eta^2 = .01$). However, when participants had a single goal, there was no such effect (F<1).

Optimism bias in goal setting. In addition to an effect of number of goals ($F(2, 598)$ = 52.86, $p < .001$, $\eta^2 = .14$), a two-way ANOVA revealed a main effect of time budgeting on goal setting ($F(1, 598) = 20.81$, $p < .001$, $\eta^2 = .03$; see figure 19). Consistent with the prior results, overall, budgeting time first encouraged people to set lower goals ($M_{control}$ = 59.78, SD = 36.30 vs. $M_{time\text{-}first}$ = 28.80, SD = 25.31).

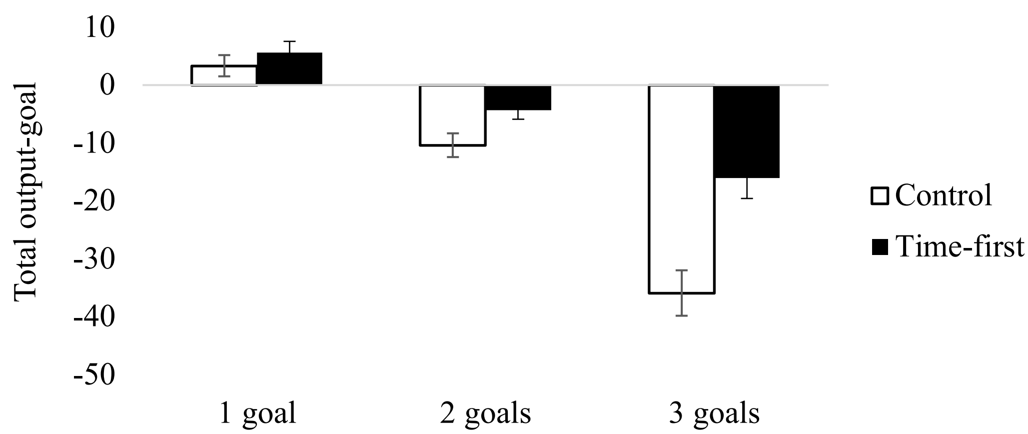
FIGURE 19: BUDGETING TIME FIRST ATTENUATES OPTIMISM BIAS IN MULTIPLE (BUT NOT SINGLE) GOAL SETTING



Importantly, these effects were qualified by the predicted interaction ($F(2, 298) = 4.45$, $p = .012$, $\eta^2 = .01$). Supporting our theory, when participants had multiple goals, budgeting time first decreased optimism bias in goal setting (two goals: $M_{control}$ = 56.00, SD = 25.61 vs. $M_{time\text{-}first}$ = 48.20, SD = 23.08, $F(1, 598) = 3.38$, $p = .066$, $\eta^2 = .01$; three goals: $M_{control}$ = 81.39, SD = 44.67 vs. $M_{time\text{-}first}$ = 59.94, SD = 35.52, $F(1, 598) = 24.44$, $p < .001$, $\eta^2 = .04$). When participants had just a single goal, however, time budgeting had no such effect ($M_{control}$ = 42.02, SD = 22.57 vs. $M_{time\text{-}first}$ = 37.66, SD = 22.91, $F(1, 598) = 1.09$, $p = .297$).

Accuracy. In addition to a main effect of number of goals ($F(2, 598) = 68.59$, $p < .001$, $\eta^2 = .18$), a two-way ANOVA revealed a main effect of time budgeting on discrepancy ($M_{control}$ = -14.28, SD = 32.48 vs. $M_{time\text{-}first}$ = -4.44, SD = 25.31; $F(1, 598) = 19.37$, $p < .001$, $\eta^2 = .03$; see figure 20). Consistent with the prior results, overall, budgeting time first produced a smaller gap between goals and output ($M_{control}$ = 59.78, SD = 36.30 vs. $M_{time\text{-}first}$ = 28.80, SD = 25.31).

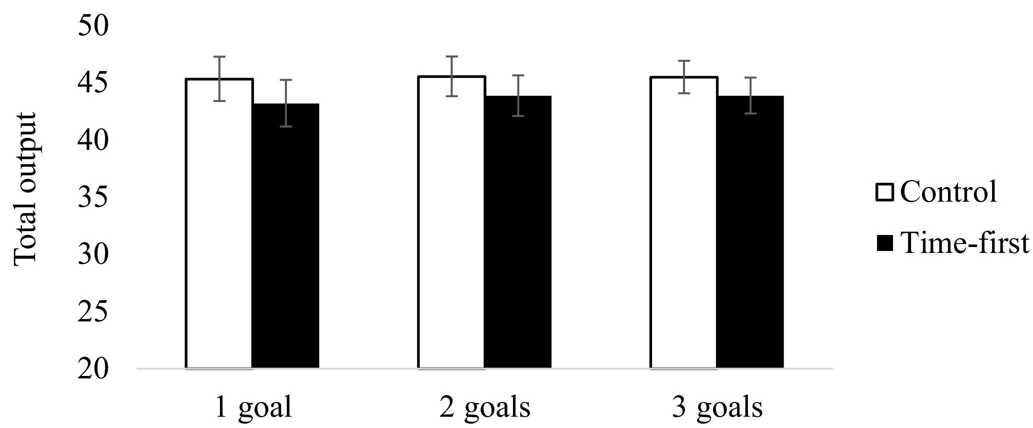
FIGURE 20: BUDGETING TIME FIRST INCREASES MULTIPLE (BUT NOT SINGLE) GOAL ACCURACY



Importantly, these effects were qualified by the predicted interaction ($F(2, 598) = 6.20$, $p = .002$, $\eta^2 = .02$). Supporting our theory, budgeting time first increased goal accuracy when participants had two goals (albeit directionally: $M_{control}$ = -10.37, SD = 20.57 vs. $M_{time\text{-}first}$ = -4.31, SD = 15.90, $F(1, 598) = 2.71$, $p = .100$) and three goals ($M_{control}$ = -35.87, SD = 39.93 vs. $M_{time\text{-}first}$ = -16.04, SD = 33.38, $F(1, 598) = 27.78$, $p < .001$, $\eta^2 = .04$). When participants only had a single goal, however, time budgeting did not influence goal accuracy ($M_{control}$ = 3.34, SD = 18.78 vs. $M_{time\text{-}first}$ = 5.57, SD = 20.00, $F < 1$).

Output. Further, consistent with the prior findings, total output did not change across time budgeting conditions. A two-way ANOVA on total output revealed no main effects nor interaction (main effect of time budgeting: $F(1, 598) = 1.57$, $p = .211$; main effect of goals and interaction F's < 1; see figure 21). Supporting our reasoning, regardless of the number and level of their goals, all participants provided the same number of total correct answers in the available six minutes ($M_{\text{one goal}} = 44.31$, SD = 20.32 vs. $M_{\text{two goals}} = 44.74$, SD = 17.63 vs. $M_{\text{three goals}} = 44.77$, SD = 14.63). That neither the number of goals nor the level of those goals influenced total output underscores that, when motivation is high and total time is constrained, the maximum amount that consumers can accomplish across goals is relatively inflexible. Budgeting time first, however, increases the number of goals that this same total output achieves.

FIGURE 21: BUDGETING TIME FIRST DOES NOT REDUCE TOTAL OUTPUT FOR SINGLE OR MULTIPLE GOAL PURSUIT



Underlying process. A two-way ANOVA revealed only the predicted effect of time budgeting on time trade-off consideration (time budgeting: $F(1, 392) = 10.06$, $p = .002$, $\eta^2 = .02$; goal number and interaction F's<1). Consistent with experiment 5 and supporting our theory, budgeting time first increased consideration of trade-offs in time use between goals during multiple goal setting ($M_{\text{control}} = 4.13$, SD = 1.92 vs. $M_{\text{time-first}} = 4.73$, SD = 1.76). Further, combining the two multiple goal conditions, a mediation analysis revealed a significant indirect effect of time trade-off consideration on goals set ($ab = -2.22$, 95% CI, -4.25 to -.67). As predicted, budgeting time first reduced optimism bias in multiple goal setting by increasing consideration of trade-offs in time use between goals.

Subjective well-being. Combining the two multiple goal conditions, three moderated mediation analyses (model 7; Hayes 2018) revealed that multiple goal pursuit moderates the indirect effect of goal achievement on subjective well-being (indexes of moderated mediation: self-efficacy = .045, 95% CI, .001 to .11; positive affect = .059, 95% CI, .002 to .12; negative affect = -.045, 95% CI, -.10 to -.001). Supporting our theory, only when participants had multiple goals did budgeting time first boost self-efficacy, increase positive affect, and decrease negative affect through its effect on goal achievement (self-efficacy: single goal: ab = .005, 95% CI, -.02 to .04; multiple goals: ab = .051, 95% CI, .01 to .11; positive affect: single goal: ab = .007, 95% CI, -.03 to .04; multiple goals: ab = .066, 95% CI, .02 to .12; negative affect: single goal: ab = -.005, 95% CI, -.03 to .02; multiple goals: ab = -.050, 95% CI, -.10 to -.01).

Discussion

Experiment 6 underscores the underlying role of time trade-off consideration through moderation and mediation. First, as expected, the benefits of budgeting time first depended on the number of goals. Because trade-offs in time use are only relevant when setting multiple goals (vs. a single) goal, and considering time trade-offs to a greater extent is what encourages people to set less overly optimistic goals, only when participants had multiple goals did budgeting time first cause them to set more accurate (but no less motivating) goals that they were more likely to achieve. Budgeting time before setting goals is therefore uniquely beneficial in situations where consumers set and pursue multiple goals within time constraints.

Second, as in experiment 5, measured perceptions of time trade-offs during goal setting mediated the effect of budgeting time first on goal setting. When participants set goals for multiple tasks, budgeting the fixed amount of total time across tasks before setting goals increased time-tradeoff consideration, which caused participants to set lower multiple goals.

Notably, in addition to time budgeting not influencing how much people did, total output was also unaffected by number of goals. Underscoring the notion that the maximum amount people can do is limited when motivation is high and time is constrained, participants across all conditions got the same total number of correct answers. Thus, although participants' optimism about what they could achieve (i.e., total goals) increased with the number of goals, what they were ultimately able to do remained unchanged. Because errors in goal-setting accuracy increased as more goals competed for the same (limited) time, budgeting time first produced greater benefits for larger numbers of goals. [17]

Finally, experiment 6 provides further evidence that budgeting time first has downstream implications for subjective well-being. By increasing multiple goal achievement, budgeting time first increased self-efficacy and positive affect, and decreased negative affect. Further, supporting our theory, because budgeting time first did not increase single goal achievement, its well-being benefits only emerged for multiple goals (vs. a single goal).

GENERAL DISCUSSION

Multiple goal pursuit is a part of everyday life. Consumers have many goals (e.g., career, social, health, and personal interests) and only 24 hours a day to pursue them. When the

[17] A follow-up study showed that number of goals moderates the goal setting effects even when people with more goals also have more time. The design was the same as experiment 6, except that participants had a total of 2, 4, or 6 minutes in the one, two, and three-goal conditions, respectively (MTurk, N = 579). Consistent with the main results, a two-way ANOVA revealed a significant main effect of time budgeting on total goals set ($F(1, 573) = 8.36$, $p = .004$), qualified by the expected interaction ($F(2, 573) = 4.37$, $p = .013$). When participants had multiple goals, budgeting time first decreased optimism bias in goal setting (two goals: $F(1, 573) = 7.76$, $p = .066$; three goals: $F(1, 573) = 8.78$, $p = .003$), but when participants had just a single goal, there was no such effect ($F < 1$). Thus, even when having more goals does not increase time constraint (i.e., place greater demands on the same total time), budgeting time first still benefits multiple (vs. single) goal pursuit. See WA for full results.

requirements of consumers' multiple goals exceed the time available to pursue them, consumers fail to achieve some (or even all) of their goals. Given limited time, how can consumers increase their chances of achieving all of their goals?

Six experiments (and three follow-up studies) demonstrated that budgeting time before setting multiple goals (vs. only setting goals) increases multiple goal achievement. Budgeting time first reduced optimism bias in multiple goal setting, encouraging people to set more accurate (i.e., lower) goals that they were more likely to all achieve. This occurred because budgeting time first increased consideration of time trade-offs in multiple goal setting (vs. alternative possibilities like elaboration or goal setting difficulty; experiment 5), encouraging consumers to bring goals into line with what could actually be achieved within the available time. Importantly, this greater accuracy was due to a change in goals set, not how much people did. Budgeting time first had no impact on total output across tasks (and actually increased output on later tasks); instead, it enabled this same output to achieve a greater number of goals.

Across experiments, the benefits of time budgeting were highly robust. We found consistent results across different numbers of multiple goals and different tasks requiring diverse skill sets (e.g., online shopping, solving math problems). The goal setting results held for chosen and assigned time budgets (experiment 5 and 5 follow-up), as well as when goal achievement was explicitly incentivized and when it was not (i.e., "mere goals"; experiments 4 and 5). Moreover, the goal achievement results held for tasks pursued in a random, fixed (experiments 3 and 6), and self-selected order (experiment 4). Importantly, when people budgeted time after (vs. before) setting goals (experiment 3) and when they had just one (vs. multiple) goals (experiment 6), the effects were attenuated. Time budgeting only benefitted goal setting and achievement when it could increase time trade-off consideration during goal setting.

Finally, the experiments demonstrate downstream consequences for boosting subjective well-being. By increasing multiple goal achievement, budgeting time first increased self-efficacy (experiments 4 and 6), increased positive affect (experiments 2, 4, and 6), and decreased negative affect (experiments 4 and 6).

Theoretical contributions

The findings make four main contributions. First, they advance understanding of the relationship between goals and time. A significant amount of research has identified how errors in time use can undermine goal achievement (Ariely and Wertenbroch 2002; Buehler et al. 1994; Fernbach et al. 2015; Jhang and Lynch 2014; Kahneman and Tversky 1977; Zauberman and Lynch 2005). But while these prior findings relate to the misallocation of time while *pursuing* goals, the current work explores the implications of time allocation while *setting* goals. We find that, by prompting consumers to consider trade-offs in time use between goals, budgeting time across goals before specifying a desired level of performance improves accuracy in goal setting. Note that, unlike reactive downward goal revision, in which goal levels are reduced following goal failure (Donovan and Williams 2003; Wang and Mukhopadhyay 2012), allocating time first is a proactive approach that encourages consumers to better incorporate time constraints into initial performance estimates.

Relatedly, this research contributes to understanding of multiple goal pursuit in time-constrained environments. Prior work has documented two distinct strategies when multiple goals compete for limited resources: efficiency planning (i.e., stretching a resource to fit one's goals) and prioritization (i.e., eliminating less-important goals; Fernbach et al. 2015; Geers, Wellman, and Lassiter 2009; Kernan and Lord 1990; Sun and Frese 2013). Fernbach et al. (2015) compare these strategies to packing a small suitcase. Efficiency planning entails squeezing in the maximum possible items, whereas priority planning entails freeing up space by leaving out some items (e.g., not bringing workout clothes). In both cases, however, goals are considered *before* resources. Taking a different approach, budgeting time first entails proactively fitting goals to available resources. To extend the suitcase analogy, budgeting time first is like using packing cubes. The total available space is divided across multiple cubes, each serving different goals (e.g., casual clothes vs. toiletries vs. business suit). By fitting each goal (i.e., how much to take) to its corresponding cube, everything is more likely to fit.

Notably, compared to efficiency and priority planning, budgeting time first offers distinct advantages. First, budgeting time should reduce the need for reactive goal revision (e.g., realizing that you've misjudged space and having to unpack and repack all contents), reducing time spent planning (a drawback of efficiency planning; Fernbach et al. 2015). Second, budgeting time first allows for relative prioritization (i.e., spending more time on more important goals) while reducing the need to eliminate valued goals in their entirety (a drawback of priority planning; Fernbach et al. 2015). Third, compared to priority planning, budgeting time first is more palatable (i.e., people do not perceive goal setting as more difficult), and by reducing the need to eliminate goals once set, should reduce any sense of preemptive goal failure. Thus, budgeting time first is a simple, flexible planning strategy that benefits goal achievement and averts some downsides of efficiency and priority planning.

Second, the findings expand knowledge of multiple goal setting. A robust body of research finds that setting specific, high goals increases performance (i.e., output) on a single focal goal (Locke and Latham 1990, 2002). However, despite the prevalence (and difficulty) of multiple goal pursuit in daily life, relatively little is known about setting effective *multiple* goals (Erez, Gopher, and Arzi 1990; Dalton and Spiller 2012; Kernan and Lord 1990; Latham and

Locke 2006, 2013; Sun and Frese 2013). The current research demonstrates that, in contrast to the benefits for single goal pursuit (Locke et al. 1991; Locke and Latham 1990, 2002; Sackett et al. 2014), for multiple goal pursuit, being overly optimistic comes at a cost. Recruiting more time for one high goal directly reduces time available for other (high) goals, decreasing the chance that multiple goals can be achieved. Moreover, underscoring that multiple goal pursuit entails time trade-offs, overly high *multiple* goals did not boost total output, and in fact hampered performance on later goals. Thus, when consumers have multiple valued goals and constrained resources, setting more accurate (vs. overly optimistic) goals should make them better off.

Third, the findings extend research on opportunity costs. Prior research has identified two key situational factors that increase opportunity cost consideration: making alternative uses for a resource salient and increasing perceived constraint (Fernbach et al. 2015; Frederick et al. 2009; Greenberg and Spiller 2016; Magen, Dweck, and Gross 2008; Northcroft and Neale 1986; Plantinga et al. 2018; Spiller 2011, 2019). We find that even when alternative uses (goals) and total time constraints are salient (i.e., in the control condition), consumers fail to sufficiently consider opportunity costs between multiple goals that compete for a shared pool of time. By increasing consideration of trade-offs in the time available for *each* goal, budgeting time first encouraged people to set more accurate multiple goals. Resource allocation (i.e., disaggregating or "unpacking" a common resource pool) may be an effective way to increase opportunity cost consideration for interdependent decisions. Notably, while the majority of prior research has examined opportunity costs for money, we contribute to emerging work examining opportunity costs for time (Chatterjee, Rai, and Heath 2016; Spiller 2019; Weiss and Kivetz 2019).

Finally, the findings contribute to research on budgeting. Extending prior research, which focused on budgeting as a tool to limit resource consumption (i.e., reducing overspending; Kan, Lynch, and Fernbach 2015; Sussman and Alter 2012), the current work investigates budgeting as a way to extract value from the budgeted resource (e.g., leveraging the same amount of time more effectively to achieve goals). When total resources are constrained, we find that budgeting (i.e., allocating) time before setting goals increases value obtained. Moreover, prior research has identified the tracking of resource consumption during goal pursuit as a critical determinant of effectiveness (Ball et al. 1998; Sussman and Alter 2012; Ülkümen, Thomas, and Moorwitz 2008). We find that, by encouraging consumers to set more accurate goals, budgeting time first increases multiple goal achievement without the need to monitor resource expenditures (i.e., no visible timer).

Implications for consumers and marketers

This research has substantive implications for consumers and marketers. First, running out of time to achieve multiple valued goals is an everyday struggle. Even if performance (i.e., total output) is constant, failing to achieve goals harms well-being and can lead to goal disengagement (Bandura and Locke 2003; Brunstein 1993; Heath et al. 1999; Soman and Cheema 2004; Weingarten et al. 2018). We identify a simple strategy—budgeting time first—that can increase consumers' chances of having sufficient time to achieve all of their goals (and enjoy downstream benefits for well-being). Across experiments, the robust difference between the time-first and control conditions indicates that consumers do not spontaneously consider time trade-offs between multiple goals (or at least, not sufficiently to set more accurate goals), underscoring the value of budgeting time first..

Second, while this research focuses on the achievement of multiple, flexible goals, (i.e., goals that can be scaled in relationship to available time), the benefits of budgeting time first are likely to generalize to other circumstances. For example, budgeting time first should increase achievement of a single, focal goal that occurs later in sequential goal pursuit. One strategy to protect time for an important goal is to prioritize order and pursue it first (Fernbach et al. 2015). However, consumers do not always have discretion over goal order, and some goals naturally are pursued later in a sequence (e.g., eating dinner with family or getting a full night's sleep). By budgeting time first, consumers should increase achievement of high-priority goals that occur later on. In addition, budgeting time first should also increase achievement of a mix of flexible and fixed goals. In general, one either does, or does not, complete a degree, participate in a meeting, or see a sporting event. (Although note that fixed goals are often achieved via flexible subgoals. One achieves the fixed goal of finishing a marathon, for instance, as a result of achieving flexible training goals over many sessions.) When consumers have both fixed and flexible goals for a time period, budgeting time first should enable consumers to set flexible goals accordingly, boosting multiple goal achievement.

Moreover, if budgeting time first makes it clear that total time is simply insufficient, consumers could still respond with prioritization (i.e., eliminating less-important goals entirely). Even in this case, whatever (more important) goals remain will be better-calibrated to available time, making consumers more likely to achieve them.

Putting time-first should be particularly useful for interdependent goal pursuits, where setting accurate (vs. optimistic) multiple goals is especially valued. A couple coordinating household chores, for instance, might split up grocery shopping and cooking responsibilities. For the partner doing the cooking, even if the shopping partner's total performance (i.e., number of purchases) is constant, overperformance on one goal does not compensate for underperformance on another (e.g., going to a specialty shop for wine, but failing to buy the requested butter and bread). Similarly, accuracy is important for a salesperson setting multiple goals for different product lines. Achieving the multiple, specified goals is more valuable than producing the same total output misaligned with goals (i.e., exceeding one sales target but failing to achieve others). Results of experiment 5 suggest that assigned time structures could be leveraged in interpersonal contexts to increase goal accuracy and multiple goal achievement. In organizational settings, assigned time budgets could increase alignment between individual efforts and firm goals.

These findings also have substantive implications for marketers, who could utilize suggested time budgets to help consumers achieve goals. When consumers have multiple goals and a constrained amount of time, they are likely to forego spending time on self-care and leisure goals, which feel less justified (Etkin and Memmi, 2019). To buffer against this, marketers of related products and services could encourage consumers to use time budgeting (i.e. allocate time on a weekend across multiple goals), increasing the likelihood that consumers preserve time for and pursue leisure goals (and in turn, consume firm offerings). Similarly, marketers of experiential offerings could offer suggested time budgets to help consumers formulate accurate (and achievable) multiple goals for their experience. For example, a resort could help consumers budget time (and thus set achievable goals for) dining, touring local sites, activities, and simply relaxing. Time structures could further be tailored to different segments (e.g., epicurians vs. adventure seekers). By encouraging consumers to set expectations that can be met (or exceeded) within available time, firms may boost satisfaction.

Note that, while one could wonder if budgeting time first would reduce enjoyment of leisure (i.e., by activating a work-oriented “calendar mindset”; Tonietto and Malkoc 2016), the time-first approach is compatible with rough scheduling (i.e., planning to engage in an activity without scheduling a specific start time), which does not interfere with enjoyment. Indeed, by encouraging consumers to set goals that fit available time, budgeting time first may reduce the need to schedule and monitor time consumption during experiences, boosting enjoyment. Further, even when some activities require scheduling, time budgeting could also be used to preserve open time for impromptu experiences.

Finally, our findings point to an unserved gap in the vast category of personal time management software. These products fall primarily into two types. Task management software enables consumers to specify goals and track progress, but goals are disconnected from time requirements. Calendaring software facilitates planning for time, but time use is disconnected from goals. Products designed for personal financial budgeting (e.g., You Need A Budget, Quicken) may offer useful inspiration. Such systems prompt consumers to allocate money across multiple goals (i.e., spending categories), and they reveal how well subsequent spending corresponds. “Zero-sum” systems, in which all available resources are assigned to goals, are particularly likely to encourage consumers to consider trade-offs in time use (and thus set goals accordingly). Applications that more effectively connect time allocation and use to associated goals could provide substantial value to consumers.

Directions for future research

These findings raise many questions for future research. First, future work could investigate when people naturally consider time budgeting before setting goals. As an initial exploration of consumers’ spontaneous preferences, we asked lab participants (N = 119) to complete the instructions and practice sections from experiment 2 and then indicate how they preferred to set their goals (“set my goals,” “allocate time to each task and then set my goals,” or “set my goals and then allocate time to each task”). Less than a third of participants indicated a preference for budgeting time first ($31.1\%_{\text{goals only}}$, $31.1\%_{\text{time-first,}}$ $37.8\%_{\text{goals-first}}$; $\chi^2(1) = 1.08$, p =

.584; time-first vs. 50%, $p < .001$).[18] Moreover, when we asked a separate sample of online panelists ($N = 121$) how they prefer to set goals in daily life, only a small minority (3.3%) indicated that they typically budget time first ("block time for different goals and then make a to-do list (decide what/how much to do)"). This suggests that, lacking an explicit prompt, most consumers are unlikely to adopt a time-first strategy. Given that it requires planning, consumers high in propensity-to-plan may be more likely to spontaneously budget time before setting goals (Lynch et al. 2010). Future research could further explore when (or which) consumers are likely to spontaneously budget time first.

Second, how will resource allocation function for resources other than time? Specifically, would budgeting money first similarly benefit consumers? Although people are generally more accurate at predicting future demands on their money than their time (Zauberman and Lynch 2005), errors in financial forecasting are nonetheless common (Peetz and Buehler 2009; Stilley, Inman, and Wakefield 2010; Sussman and Alter 2012; Sussman and O'Brien 2016). While budgeting can improve spending predictions, our findings suggest that budgeting money may be most effective when money is allocated before goal *setting* (vs. before goal pursuit; Fernbach et al. 2015; Sussman and Alter 2012). For example, using a goals-first approach, a consumer planning to buy a car and a home might first set goals (e.g., determine the desired model and age of car, home location and size) and then budget money for each purchase. In contrast, with a money-first approach the same consumer would budget money across categories *before* specifying purchase goals. Future research could explore if, by increasing goal accuracy, budgeting money before setting goals reduces overspending.

[18] Even with the small sample size, participants who chose to budget time first set directionally lower goals overall ($M_{\text{goals only}} = 83.86$, SD = 8.55, $M_{\text{time-first}} = 68.86$, SD =5.60, $M_{\text{goals-first}} = 83.86$, SD = 7.46; $F(2, 116) = 1.70$, $p = .187$; time-first vs. goals only: $p = .118$; time-first vs. goals-first: $p = .104$; goals-first vs. goals-only: $p = .990$), suggesting that people who chose other strategies would have indeed benefited from adopting this approach.

Third, future research could explore the role of budgeting time first for flexible goal setting and persistence. Demands on consumers' resources vary over time. Thus, even for single goal pursuit, setting goals in relationship to the available time should encourage flexible goal setting. For example, rather than setting a goal to walk 10,000 steps every day, a flexible goal would adjust in relationship to how much time is available (e.g., 7,000 steps on workdays vs. 11,000 on weekends). Consumers reap substantial benefits from consistently achieving even modest goals in many domains (e.g., physical activity, retirement savings, social engagement, learning a skill). Flexible goals set in relationship to available time should be more likely to be achieved within that time, boosting persistence (and thus overall performance) across time.

Finally, while the current research has focused on specific goals, time budgeting may also have benefits for pursuing nonspecific goals (i.e., "do your best" goals). Despite being prevalent and important, such goals are less motivating than specific goals because they lack relevant endpoints (Wallace and Etkin 2018). Similarly, in some domains, incremental goal progress can be difficult to observe or measure (e.g., learning, creative endeavors). For such goals, budgeting time first (e.g., setting a goal to spend a specific amount of time on an activity) may increase motivation by providing salient reference points.

Conclusion

Western culture espouses audacious goals. Consumers are encouraged to dream big, aim high, and shoot for the moon. If getting to the (metaphoric) moon is the only objective, this could be an effective strategy. But setting overly optimistic goals may not serve the needs of modern consumers who increasingly lack sufficient time to achieve their multiple goals. By budgeting time first, consumers can calibrate their sights to achieve many of their valued goals.

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APPENDIX: DETAILED INSTRUCTIONS AND DATA ANALYSIS PLAN

Procedure

Instructions. First, participants read detailed instructions (including all of the information described in this section) and completed practice questions to familiarize themselves with the tasks. Forced-choice questions were used throughout the instructions to ensure participants understood key features of the tasks and procedure.

In all experiments, participants read they had the same total amount of time to spend on multiple tasks. Tasks were completed sequentially, such that participants chose when to move ahead to the next task (i.e., the survey did not automatically transition between tasks), but they could not go backwards. Participants were always informed about the order in which tasks would be presented, which varied across studies (fixed vs. random vs. chosen by participants).

When the total time was up, the survey exited all tasks, regardless of where the participant was in the questions. No timer was displayed. If participants exited the final task with extra time remaining, they went to a waiting page until the full task time had expired (i.e., participants could not finish the study early by skipping the tasks).

The practice section consisted of a limited number of representative questions for each task. On both the practice and the real tasks, each page prominently displayed participants' goals and current score for the task (see WA for stimuli). There was no time limit on practice tasks. To help participants estimate the time requirements of the tasks, at the end of each practice task the total time spent was displayed, along with the number attempted and number correct (e.g., "You answered 2 out of 3 practice questions correctly in 15 seconds.").

Tasks were incentive-compatible. Participants earned points for correct answers, and top performers (e.g., those scoring in the top 20%; except in experiment 2) were entered into a lottery for a substantial bonus prize (e.g., $100). The scoring system incentivized participants to set multiple goals that were challenging and achievable (i.e., accurate). On each task (except experiments 4 and 5, in which scores did not depend on goal achievement), participants received 2 points per correct answer once their goal was achieved, with no points until the goal was reached and no additional points for exceeding the goal. To reinforce multiple goal pursuit, participants had to achieve a minimum on each task (e.g., 10 correct answers) to receive a score. There were no explicit maximum goals; we told participants that each task had a limited number of questions and if a goal exceeded that limit, the effective goal would be to answer all available questions correctly. Thus, setting goals that were either very low or unachievably high would limit chances at obtaining a high score. Participants could maximize chances for a bonus by setting goals that represented the highest output they could achieve within the total time allowed.

Goal setting. Following the instructions and practice section, participants set their goals for how many correct answers to obtain on each task. Throughout the studies, our key manipulation is whether participants first budget time to each task before setting goals (vs. only set goals). In the time-first condition, we asked participants to first indicate how many minutes (of the total X minutes) they intended to spend on each task. We told participants the survey would enforce only the total time limit and not the time budgeted to each goal (e.g., “Note: This is for your planning; the computer will not enforce the individual task times”). In the control condition, participants did not see this question.

Next, all participants set their goals for each task. In time-first condition, participants’ intended time allocation per task was displayed following the task name (e.g., “Spelling (3 minutes)”), whereas in the control condition participants saw only the tasks.

Notably, for all participants, all goals were set on a single page displaying a reminder regarding the total task time (e.g., "Reminder: You have 7 minutes total for all tasks."). Thus, participants viewed all goals together, and, even in the control condition, the total available time was salient during goal setting.

Goal pursuit. After goal setting, participants pursued their goals, and we measured performance. Consistent with the instructions, participants' goals and running scores for correct answers were displayed on each page throughout the tasks. No timer was displayed, although participants were not prevented from monitoring time through other means (e.g., on a computer monitor). Participants chose when to advance to the next task in the sequence, but they could not go backward. When the total time was up, the survey exited the tasks; if participants exited the tasks with extra time remaining, they went to a waiting page until the full time was up.

Following goal pursuit, participants completed any additional measures (as described in individual experiments), responded to demographic questions, and were given information about when the lottery bonus(es) would be awarded.

Measures

We test our predictions using the measures described below. These measures and analyses are reported in the results for each experiment; supplemental measures and analyses are reported in the Web Appendix.

Multiple goal achievement. We tested multiple goal achievement as the main effect of time budgeting on two measures: the total number of goals achieved and the likelihood of achieving all goals (two or three, depending on the experiment). Main effects of task (when significant) are also reported in the main text. Interactions for time budgeting × task, and contrasts for the effect of time budgeting within each task are reported in the Web Appendix.

Optimism bias in goal setting. We tested goal setting as the main effect of time budgeting on goals set (i.e., total goals). When significant, main effects of task are also reported in the main text. Analyses of the time budgeting × task interaction and contrasts for the effect of time budgeting within each task are reported in the supplemental analyses. Analyses are conducted using effective goals (i.e., adjusted for outliers). Consistent with the instructions given to participants, if a goal exceeded available questions, the effective goal became to answer all task questions correctly (i.e., if a participant set a goal of 75 for correct answers on a task with 65 questions, the effective goal was 65). The upper limits for available questions were set generously (i.e., output was not artificially restricted), and the number of goals subject to the outlier adjustment is limited (< 2.50% on average). Values and full analyses for unadjusted goals, as well as the incidence of outliers, are reported in the WA.

Time trade-off consideration. To measure consideration of time trade-offs between goals, we asked participants, "While setting each of your goals, to what extent did you consider how the time spent on that goal would take away from the time available for the other goal?" (1 = *Not at all*, 7 = *Very much*).

Goal accuracy. To measure goal setting accuracy, we subtracted participants' goals for each task from their output on that task (i.e., discrepancy). Thus, a discrepancy value of 0 indicates perfect accuracy (i.e., output at the exact level of the goal), positive values indicate a positive discrepancy (i.e., overperformance relative to goal), and negative values indicate a negative discrepancy (i.e., underperformance relative to goal). We tested the main effects of time budgeting and the time budgeting × task interactions on discrepancy. Main effects of task (i.e., the first vs. second task in the sequence), when significant, are also reported in the main text. Contrasts for the effect of time budgeting within each task are reported in the WA.

Output. We tested the main effect of time budgeting and the time budgeting × task interaction on task output (i.e., number of correct answers). Main effects of task (when significant) are also reported in the main text. Contrasts for the effect of time budgeting within each task are reported in the WA.

Subjective well-being. To explore downstream consequences for subjective well-being (e.g., self-efficacy, positive affect, and negative affect), we tested the indirect effect of time budgeting on subjective well-being through multiple goal achievement (i.e., the number of goals achieved). Direct effects are reported in the supplemental analyses.

BUDGETING TIME FIRST INCREASES MULTIPLE GOAL ACHIEVEMENT

WEB APPENDICES

Table of contents

OVERVIEW OF SUPPLEMENTAL ANALYSES

Consistent with the reporting plan described in the Overview of Experiments, analyses of key theoretical relevance are reported in the main text. The Web Appendix contains the following supplemental analyses for goal performance experiments (goal setting experiments report goal setting measures). For follow-up experiments, primary measures are reported (as described in the Analysis Plan in the main text Appendix). For experiment 6, in which goal number was manipulated between subjects, between-subjects measures are reported. Additional supplemental analyses for specific experiments are as referenced in the main text.

Multiple goal achievement

- Full results for a repeated-measures logistic regression with condition as a between-subjects factor, task as a within-subjects factor, and goal achievement for each task as the dependent variable (conducted in SPSS using the generalized estimating equations procedure)
- Percent goal achievement for each task and contrasts for the effect of condition within each task; for experiments in which task order varies, results are reported both for task order (i.e., achievement of the first task goal, regardless of content) and task content (i.e., achievement of the spelling task goal, regardless of presentation order)

Goal setting

- Full results for a between (condition) x within (task) mixed ANOVA on final goals set (i.e., after adjusting for outliers)
- Full results for a between (condition) x within (task) mixed ANOVA on raw goals set (i.e., not adjusted for outliers)
- Number and percentage of goals subject to outlier adjustment (i.e., goals that exceeded the upper limit of task questions and were recoded accordingly)
- For both adjusted and raw goal values, means and standard deviations for total goals set and goals set for each task, with contrasts for the effect of condition within each task

Goal accuracy

- Full results for a between (condition) x within (task) mixed ANOVA on discrepancy scores
- Means and standard deviations for total discrepancy and discrepancy for each task, with contrasts for the effect of condition within each task

Output

- Full results for a between (condition) x within (task) mixed ANOVA on total output (i.e., number of correct answers)
- Means and standard deviations for total output and output for each task, with contrasts for the effect of condition within each task

Ancillary scoring measures

- Percent of participants who achieved the minimum requirement (e.g., obtaining at least 10 correct answers on each task) and logistic regressions testing differences by condition
- As applicable, percent of participants who qualified for the bonus lottery, threshold score for the lottery, and logistic regressions testing differences by condition

Time budgeting and use

- For time budgeting conditions, time allocated to each task and regressions of time allocated to a task predicting time spent on that task
- For all conditions, means and standard deviations for time spent on each task
- For time budgeting conditions, means and standard deviations for time spent allocating time (when measured)
- Means and standard deviations for time spent setting goals (when measured) and ANOVA results testing differences by condition
- Means and standard deviations for time spent on the task waiting page (i.e., unused task time) and ANOVA results testing differences by condition

Subjective well-being

- Means and standard deviations for relevant measures and ANOVA results for direct effects of condition

EXPERIMENT 1: STIMULI AND SUPPLEMENTAL ANALYSES

Stimuli

Shopping practice

Walmart

Click here to shop (the site will open in a new window): Walmart.com

SHOPPING PRACTICE: Find **2 products you like** (that meet criteria below) and enter the URLs and prices.

- To copy a product URL: Select the web address (at the top of the product webpage) by double clicking it --> right click --> select copy --> right click in the box where you want to paste it --> select paste
- If you need technical help, please ask the Research Assistant at the front desk.

HINT: To find **products that cost $10 or less**, you can search on the store's site using terms like "under $10," or "gifts under $10." You can also sort products by lowest to highest price.

Goal: Select 2 products

	URL (web address)	Price (X.XX)
Product 1		
Product 2		

Shopping practice feedback page

You shopped for **2** practice products in **32.467** seconds.

Click the arrow below for instructions about task scores and bonus.

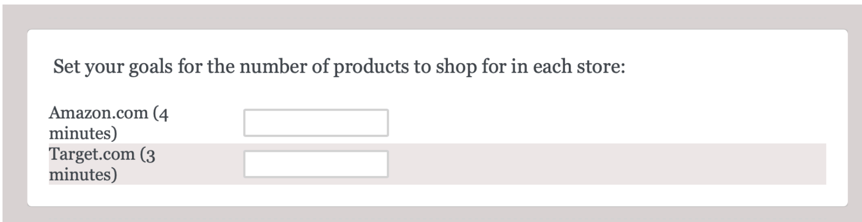
Time budgeting

Before setting your goals, indicate how many minutes (of the total 7) you intend to spend shopping in each store. (Note: This is for your planning; the computer will not enforce the individual store times.)

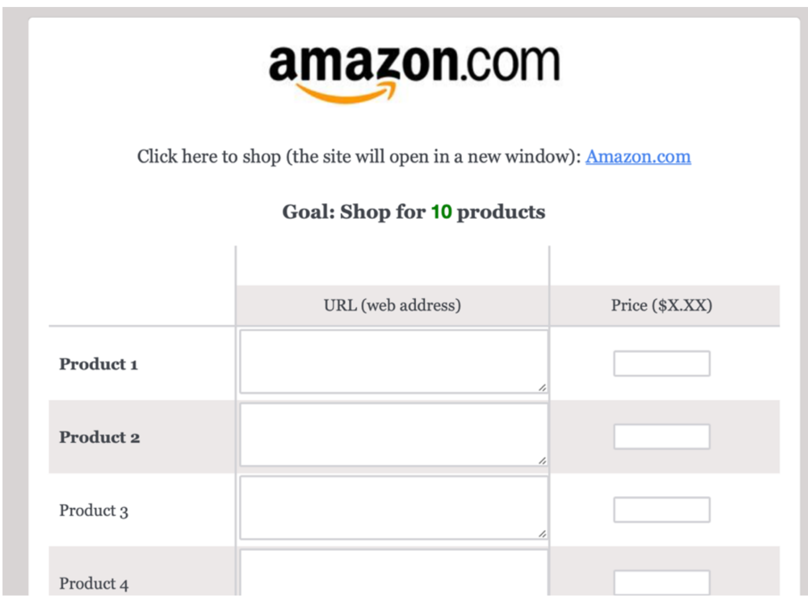
Amazon.com	0
Target.com	0
Total	0

Goal setting–control condition

Goal setting–time-first condition



Shopping example



Goal achievement

Repeated-measures logistic regression with condition as a between-subjects factor (control = 0, time-first = 1), store as a within-subjects factor (Store 1 = 0, Store 2 = 1), and goal achievement for each store as the dependent variable (failure = 0; achievement =1)

VARIABLE	PARAMETER ESTIMATE
Store	b = -2.28 Wald χ^2 (1) = 24.98, p < .001, OR = .10
Condition	b = .99, Wald χ^2(1) = 4.67, p = .031, OR = 2.70
Condition × store	b = .81, Wald χ^2 (1) = 1.89, p = .169, OR = 2.25

STORE	CONTROL	TIME-FIRST	Total	Logistic regression
Store 1	62%	82%	73%	b = .99, Wald $\chi^2(1)$ = 4.67, p = .031, OR = 2.70
Store 2	15%	51%	34%	b = 1.80, Wald $\chi^2(1)$ = 13.56, p < .001, OR = 6.07
Amazon	40%	65%	53%	b = 1.06, Wald $\chi^2(1)$ = 6.73, p = .009, OR = 2.89
Target	38%	67%	53%	b = 1.23, Wald $\chi^2(1)$ = 8.84, p = .003, OR = 3.43

Goal setting

Final goals (adjusted for outliers)

Between (condition) x within (store) mixed ANOVA

EFFECT	TEST
Store	$F(1, 101) = 16.54, p < .001, \eta^2 = .14$
Condition	$F(1, 101) = 9.85, p = .002, \eta^2 = .09$
Condition × store	$F(1, 101) = 2.56, p = .113, \eta^2 = .02$

STORE	CONTROL	TIME-FIRST	Total	Contrast
Amazon	M = 9.75, SD = 4.88	M = 7.67, SD = 4.38	M = 8.64, SD = 4.71	$F(1, 101) = 5.18, p = .025, \eta^2 = .05$
Target	M = 8.96, SD = 4.98	M = 5.85, SD = 3.70	M = 7.30, SD = 4.60	$F(1, 101) = 13.08, p < .001, \eta^2 = .11$
Total	M = 18.71, SD = 9.62	M = 13.53, SD = 7.08	M = 15.94, SD = 8.71	

Outlier adjustment

Three goals (1.46% of the total 206) exceeded the limit (20 products per store) and were recoded as 20.

Raw goals (not adjusted for outliers)

Between (condition) x within (store) mixed ANOVA

EFFECT	TEST
Store	$F(1, 101) = 15.70, p < .001, \eta^2 = .13$
Condition	$F(1, 101) = 9.28, p = .003, \eta^2 = .08$
Condition × store	$F(1, 101) = 2.69, p = .104, \eta^2 = .02$

STORE	CONTROL	TIME-FIRST	Total	Contrast
Amazon	M = 9.96, SD = 5.50	M = 7.76, SD = 4.68	M = 8.79, SD = 5.17	$F(1, 101) = 4.79, p = .031, \eta^2 = .05$

Target	M = 9.17, SD = 5.62	M = 5.85, SD = 3.70	M = 7.40, SD = 4.96	$F(1, 101) = 12.76$, $p = .001$, $\eta^2 = .11$
Total	M = 19.13, SD = 10.91	M 13.62= , SD = 7.29	M = 16.18, SD = 9.52	

Goal accuracy

Between (condition) x within (store) mixed ANOVA, dependent variable is goal discrepancy (output – goal).

EFFECT	TEST
Store	$F(1, 101) = 58.52$, $p < .001$, $\eta^2 = .35$
Condition	$F(1, 101) = 14.39$, $p < .001$, $\eta^2 = .12$
Condition × Store	$F(1, 101) = 7.50$, $p = .007$, $\eta^2 = .04$

STORE	CONTROL	TIME-FIRST	Total	Contrast
Store 1	M = -1.62, SD = 5.06	M = -0.15, SD = 2.94	M = -0.83, SD = 4.11	$F(1, 101) = 3.39$, $p = .068$, $\eta^2 = .03$
Store 2	M = -6.85, SD = 6.00	M = -2.62, SD = 4.06	M = -4.59, SD = 5.46	$F(1, 101) = 18.00$, $p < .001$, $\eta^2 = .15$
Total	M = -8.48, SD = 9.31	M = -2.76, SD = 5.78	M = -5.43, SD = 8.11	

Output

Between (condition) x within (store) mixed ANOVA, dependent variable is total output (number of products selected)

EFFECT	TEST
Store	$F(1, 101) = 57.17$, $p < .001$, $\eta^2 = .35$
Condition	$F(1, 101) = .26$, p =.608
Condition × Store	$F(1, 101) = 3.27$, $p = .074$, $\eta^2 = .02$

STORE	CONTROL	TIME-FIRST	TOTAL	CONTRAST
Store 1	M = 7.75, SD = 4.36	M = 7.00, SD = 4.42	M = 7.35, SD = 4.39	$F(1, 101) = .75$, $p = .389$
Store 2	M = 2.48, SD = 3.54	M = 3.76, SD = 3.04	M = 3.17, SD = 3.33	$F(1, 101) = 3.93$, $p = .050$, $\eta^2 = .04$
Total	M = 10.23, SD = 5.45	M = 10.76, SD = 5.09	M = 10.51, SD = 5.24	

Ancillary scoring measures

Minimum qualification

Percent of participants meeting the minimum requirement (obtaining at least two correct answers on each store): Control 54%, Time-first 78%; $b = 1.10$, Wald $\chi^2(1) = 6.46$, $p = .011$, OR = 3.03

Lottery qualification

Percent of participants who qualified for the bonus lottery by earning scores in the top 20% (> = 24 points): Control 36%, Time-first 42%; $b = .49$, Wald $\chi^2(1) = .88$, $p = .348$, OR = 1.64

Time budgeting and use

Time budgeting (time-first condition only)

- Time spent on time budgeting page (seconds):
  - $M = 27.56$, SD = 19.07
- Time allocated to each store (minutes):
  - Amazon: $M = 3.72$, SD = .80
  - Target: $M = 3.28$, SD = .80
- Regression of time allocated on time spent for each store:
  - Amazon: $\beta = .35$, $t(53) = 2.72$, $p = .009$, $R^2_{adj} = .11$
  - Target: $\beta = .31$, $t(53) = 1.82$, $p = .021$, $R^2_{adj} = .08$

Time spent shopping (seconds)

STORE	CONTROL	TIME-FIRST
Store 1	$M = 297.33$, SD = 109.90	$M = 256.17$, SD = 120.41
Store 2	$M = 94.47$, SD = 78.23	$M = 131.52$, SD = 74.78
Amazon	$M = 187.03$, SD = 142.43	$M = 203.72$, SD = 123.32
Target	$M = 204.77$, SD = 136.98	$M = 183.97$, SD = 112.23

Time spent on goal setting page (seconds)

- $M_{control} = 30.29$, SD = 30.54 vs. $M_{time\text{-}first} = 32.11$, SD = 23.86; $F(1, 101) = .15$, $p = .735$

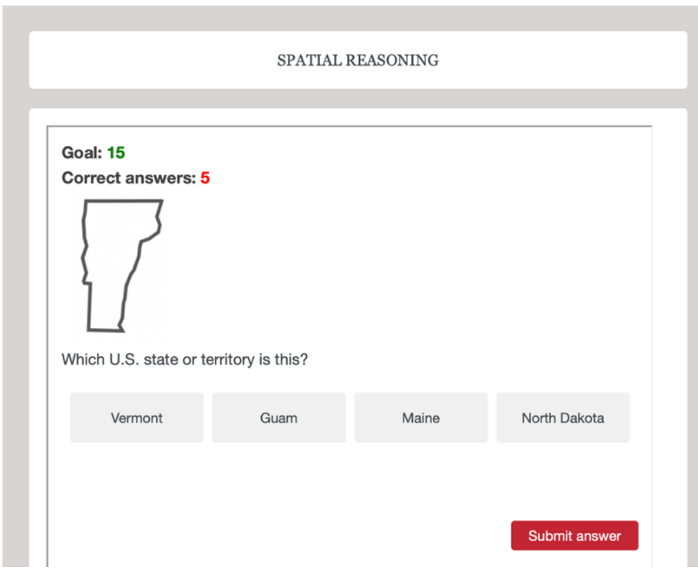
Time spent on waiting page (seconds)

- $M_{control}$ = 27.44, SD = 62.28 vs. $M_{time\text{-}first}$ = 43.96, SD = 69.51; F (1, 101) = 1.59, p = .21, η^2 = .02

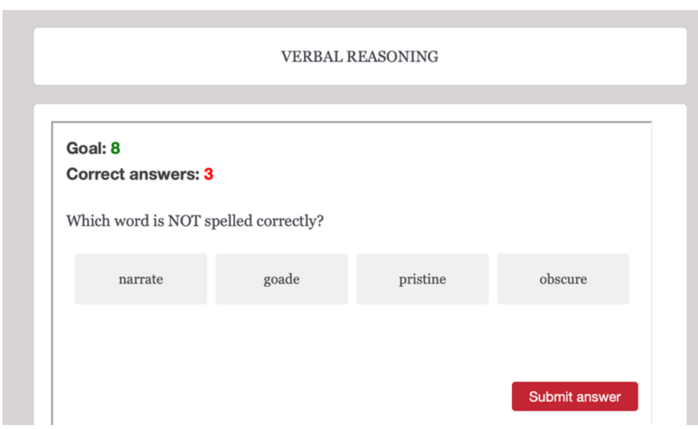
EXPERIMENT 2: STIMULI AND SUPPLEMENTAL ANALYSES

Stimuli

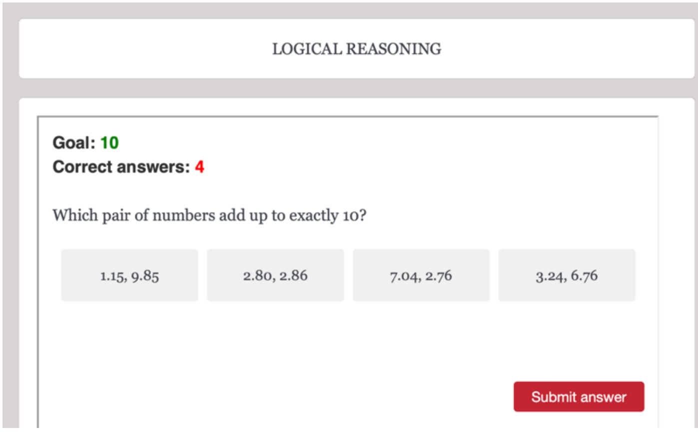
Geography quiz example



Spelling quiz example



Math quiz example



Perception of multiple goal pursuit

Number of perceived goals

- $M_{\text{control}} = 3.04$, SD = 1.08 vs. $M_{\text{time-first}} = 3.03$, SD = 1.13; ANOVA: $F(1, 148) = .01$, $p = .937$

Figure: Number of perceived goals

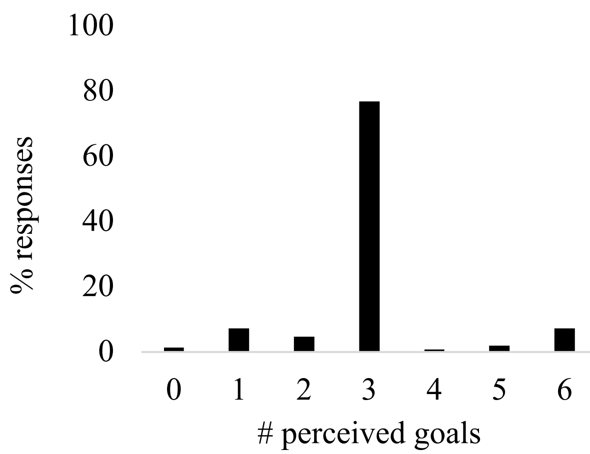


Table: Bivariate correlations between quiz goal achievement and happiness with performance

	Geography quiz happiness	Spelling quiz happiness	Math quiz happiness
Geography goal achievement	.39***	.06	-.06
Spelling goal achievement	.23**	.45***	.19*
Math goal achievement	.17	.19*	.47***

* $p < .05$, **$p < .01$, ***$p < .001$

Multiple goal achievement

Repeated-measures logistic regression with condition as a between-subjects factor (control = 0, time-first = 1), quiz as a dummy-coded within-subjects factor (Quiz3vsQuiz 1: quiz 3 = 1, quiz 1 = 0; Quiz2vsQuiz1: quiz 2 = 1, quiz 1 = 0), and goal achievement for each quiz as the dependent variable (failure = 0; achievement =1)

VARIABLE	PARAMETER ESTIMATE
Quiz2vsQuiz1	b = -.95, Wald χ^2 (1) = 11.61, p = .001, OR = .39
Quiz3vsQuiz1	b = -2.02, Wald χ^2 (1) = 37.15, p < .001, OR = .13
Condition	b = .84, Wald χ^2 (1) = 4.61, p = .032, OR = 2.33
Condition × Quiz2vsQuiz1	b = -.09, Wald χ^2 (1) = .06, p = .814
Condition × Quiz3vsQuiz1	b = .07, Wald χ^2 (1) = .02, p = .878

QUIZ	CONTROL	TIME-FIRST	Total	Logistic regression
Quiz 1	68%	83%	75%	b = .84, Wald χ^2(1) = 4.61, p = .032, OR = 2.33
Quiz 2	45%	63%	54%	b = .76, Wald χ^2(1) = 5.14, p = .023, OR = 2.13
Quiz 3	22%	41%	31%	b = .92, Wald χ^2(1) = 6.24, p = .012, OR = 2.50
Geography	49%	62%	55%	b = .54, Wald χ^2(1) = 2.62, p = .105, OR = 1.71
Spelling	42%	63%	53%	b = .87, Wald χ^2(1) = 6.70, p = .010, OR = 2.38
Math	43%	62%	53%	b = .76, Wald χ^2(1) = 5.14, p = .023, OR = 2.13

Goal setting

Final goals (adjusted for outliers)

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	F(2, 296) = 5.99, p = .003, η^2 = .04
Condition	F(1, 148) = 9.62, p = .002, η^2 = .06
Condition × quiz	F(2, 296) = .81, p = .447

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Geography	M = 26.89, SD = 14.97	M = 21.57, SD = 4.92	M = 24.19, SD = 15.13	F(1, 148) = 4.76, p = .031, η^2 = .03
Spelling	M = 32.11, SD = 16.68	M = 23.99, SD = 15.72	M = 27.99, SD = 16.65	F(1, 148) = 9.42, p = .003, η^2 = .06

Math	M = 30.19, SD = 15.89	M = 23.07, SD = 15.75	M = 26.58, SD = 16.16	$F(1, 148) = 7.60$, $p = .007$, $\eta^2 = .05$
Total	M = 89.19, SD = 40.69	M = 68.62, SD = 40.52	M = 78.77, SD = 41.76	

Outlier adjustment

Eleven goals (2.44% of the total 450) exceeded the limit (65 answers per quiz) and were recoded as 65.

Raw goals (not adjusted for outliers)

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 296) = 3.73$, $p = .025$, $\eta^2 = .02$
Condition	$F(1, 148) = 8.94$, $p = .003$, $\eta^2 = .06$
Condition × quiz	$F(2, 296) = 1.27$, $p = .281$, $\eta^2 = .01$

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Geography	M = 26.96, SD = 15.15	M = 21.70, SD = 15.33	M = 24.29, SD = 15.42	$F(1, 148) = 4.47$, $p = .036$, $\eta^2 = .03$
Spelling	M = 36.16, SD = 40.57	M = 24.38, SD = 16.98	M = 30.19, SD = 31.41	$F(1, 148) = 5.43$, $p = .021$, $\eta^2 = .04$
Math	M = 30.19, SD = 15.89	M = 23.79, SD = 18.13	M = 26.95, SD = 17.30	$F(1, 148) = 5.28$, $p = .023$, $\eta^2 = .03$
Total	M = 93.31, SD = 52.53	M = 69.87, SD = 43.13	M = 81.43, SD = 49.26	

Goal accuracy

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 296) = 43.68$, $p < .001$, $\eta^2 = .22$
Condition	$F(1, 148) = 10.73$, $p = .001$, $\eta^2 = .07$
Condition × quiz	$F(2, 296) = 4.76$, $p = .009$, $\eta^2 = .02$

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Quiz 1	M = -4.42, SD = 15.18	M = -1.22, SD = 13.51	M = -2.80, SD = 14.40	$F(1, 148) = 1.86$, $p = .175$, $\eta^2 = .01$
Quiz 2	M = -12.76, SD = 16.17	M = -6.22, SD = 14.63	M = -9.45, SD = 15.71	$F(1, 148) = 6.74$, $p = .010$, $\eta^2 = .04$
Quiz 3	M = -21.03, SD = 19.40	M = -9.62, SD = 17.76	M = -15.25, SD = 19.39	$F(1, 148) = 14.13$, $p < .001$, $\eta^2 = .09$

Total	M = -38.20, SD = 41.32	M = -17.07, SD = 37.66	M = -27.49, SD = 40.78	

Output

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 296) = 31.52$, $p < .001$, $\eta^2 = .17$
Condition	$F(1, 148) = .03$, $p = .874$
Condition × quiz	$F(2, 296) = 6.70$, $p = .001$, $\eta^2 = .04$

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Quiz 1	M = 24.92, SD = 15.80	M = 20.37, SD = 12.02	M = 22.61, SD = 14.15	$F(1, 148) = 3.95$, $p = .049$, $\eta^2 = .03$
Quiz 2	M = 18.27, SD = 13.20	M = 17.24, SD = 10.95	M = 17.75, SD = 12.08	$F(1, 148) = 27$, $p = .602$
Quiz 3	M = 7.80, SD = 9.74	M = 13.95, SD = 14.22	M = 10.91, SD = 12.56	$F(1, 148) = 9.50$, $p = .002$, $\eta^2 = .06$
Total	M = 50.99, SD = 23.34	M = 51.55, SD = 20.36	M = 51.27, SD = 21.81	

Subjective well-being

- Overall happiness with quiz performance: $M_{\text{control}} = 3.95$, SD = 1.86 vs. $M_{\text{time-first}} = 4.38$, SD = 1.77; ANOVA: $F(1, 148) = 2.16$, $p = .144$, $\eta^2 = .01$

Ancillary scoring measures

Minimum qualification

Percent of participants meeting the minimum requirement (obtaining at least 10 correct answers on each quiz): Control 35% vs. Time-first 57%; $b = .88$, Wald $\chi^2(1) = 6.83$, $p = .009$, OR = 2.41

Lottery tickets

$M_{\text{control}} = 3.60$, SD = 5.61 vs. $M_{\text{time-first}} = 4.40$, SD = 4.75; $F(1, 148) = .89$, $p = .347$

Time budgeting and use

Time budgeting (time-first condition only)

- Time allocated to each quiz (minutes):
    - Geography: $M = 2.12$, SD = .56
    - Spelling: $M = 2.04$, SD = .63
    - Math: $M = 2.84$, SD = .80

- Regression of time allocated on time spent for each quiz:
    - Geography: $\beta = .01$, $t(74) = .11$, $p = .909$
    - Spelling: $\beta = .09$, $t(74) = 80$, $p = .428$
    - Math: $\beta = -.09$, $t(74) =$, $p = .445$

Time spent on quizzes (seconds)

STORE	CONTROL	TIME-FIRST
Quiz 1	$M = 186.27$, SD = 96.76	$M = 167.74$, SD = 88.79
Quiz 2	$M = 120.11$, SD = 65.73	$M = 111.71$, SD = 57.37
Quiz 3	$M = 50.55$, SD = 54.18	$M = 83.25$, SD = 68.17
Geography	$M = 107.34$, SD = 86.75	$M = 100.26$, SD = 62.07
Spelling	$M = 116.77$, SD = 90.55	$M = 145.41$, SD = 92.32
Math	$M = 132.82$, SD = 99.47	$M = 117.03$, SD = 78.34

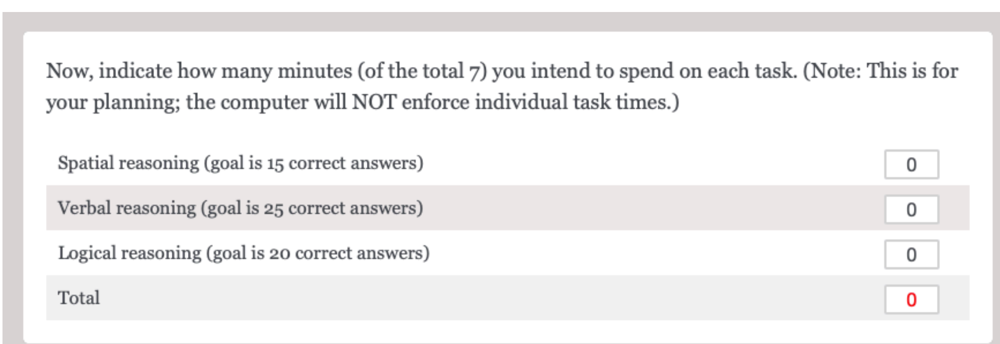
Time spent on waiting page (seconds)

- $M_{\text{control}} = 52.75$, SD = 93.63 vs. $M_{\text{time-first}} = 47.22$, SD = 76.99; $F(1, 148) = .16$, $p = .693$

EXPERIMENT 3: STIMULI AND SUPPLEMENTAL ANALYSES

Stimuli

Time budgeting page (goals-first condition)


Now, indicate how many minutes (of the total 7) you intend to spend on each task. (Note: This is for your planning; the computer will NOT enforce individual task times.)

Spatial reasoning (goal is 15 correct answers)	0
Verbal reasoning (goal is 25 correct answers)	0
Logical reasoning (goal is 20 correct answers)	0
Total	0

Multiple goal achievement

Repeated-measures logistic regression with condition as a dummy-coded between-subjects factor (TimeFirstvsControl: Timefirst = 1, Control = 0; GoalsfirstvsControl: Goals-first = 1; Control = 0), quiz as a dummy-coded within-subjects factor (MathvsGeography: Math = 1, Geography = 0; SpellingvsGeography: Spelling = 1, Geography = 0), and goal achievement for each quiz as the dependent variable (failure = 0; achievement =1)

VARIABLE	PARAMETER ESTIMATE
MathvsGeography	b = -1.20, Wald χ^2 (1) = 25.26, p < .001, OR = .30
SpellingvsGeography	b = -.26, Wald χ^2 (1) = 2.31, p = .128
TimeFirstvsControl	b = .69, Wald χ^2 (1) = 3.43, p = .064, OR = 1.99
GoalsFirstvsControl	b = -.37 , Wald χ^2 (1) = 1.33, p = .249
TimeFirstvsControl × MathvsGeography	b = -.12, Wald χ^2 (1) = .11, p = .741
TimeFirstvsControl × SpellingvsGeography	b = .03, Wald χ^2 (1) = .01, p = .929
GoalsFirstvsControl × MathvsGeography	b = .14, Wald χ^2 (1) = .18 , p = .668
GoalsFirstvsControl × SpellingvsGeography	b = .51, Wald χ^2 (1) = 3.93, p = .048, OR = 1.66

					Logistic regressions		
QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST	Total	Time-first vs. Control	Goals-first vs. Control	Time-first vs. Goals-first
Geography	76%	86%	68%	77%	b = .69, Wald χ^2(1) = 3.43, p = .064, OR = 1.99	b = -.37, Wald χ^2(1) = 1.33, p = .249	b = .1.06, Wald χ^2(1) = 8.57, p = .003, OR = 2.88
Spelling	71%	83%	73%	76%	b = .72, Wald χ^2(1) = 4.30, p = .038, OR = 2.05	b = .14, Wald χ^2(1) = .19, p = .666	b = .58, Wald χ^2(1) = 2.72, p = .099, OR = 1.78
Math	48%	62%	43%	51%	b = .57, Wald χ^2(1) = 3.88, p = .049, OR = 1.76	b = -.23, Wald χ^2(1) = .63, p = .428,	b = .79, Wald χ^2(1) = 7.50, p =.006, OR = 2.21

Goal setting

Final goals (adjusted for outliers)

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 590) = 18.82, p < .001, \eta^2 = .06$
Condition	$F(2, 295) = 6.28, p = .002, \eta^2 = .04$
Condition × quiz	$F(4, 590) = .80, p = .527$
Condition within geography	$F(2, 295) = 6.37, p = .002, \eta^2 = .04$
Condition within spelling	$F(2, 295) = 5.68, p = .004, \eta^2 = .04$
Condition within math	$F(2, 295) = 3.46, p = .033, \eta^2 = .02$

QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST	Total
Geography	*M* = 23.81, SD = 13.74	*M* = 19.23, SD = 11.11	*M* = 25.42, SD = 13.18	*M* = 22.79, SD = 12.94
Spelling	*M* = 23.54, SD = 13.57	*M* = 19.55, SD = 10.88	*M* = 25.49, SD = 13.46	*M* = 22.83, SD = 12.88
Math	*M* = 20.31, SD = 12.27	*M* = 17.67, SD = 10.60	*M* = 22.00, SD = 12.22	*M* = 19.97, SD = 11.81
Total	*M* = 67.66, SD = 34.46	*M* = 56.46, SD = 30.28	*M* = 72.91, SD = 35.65	*M* = 65.59, SD = 34.11

Outlier adjustment

Thirteen goals (1.45% of the total 894) exceeded the limit (56 answers per quiz) and were recoded as 56.

Raw goals (not adjusted for outliers)

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 590) = 15.64, p < .001, \eta^2 = .05$
Condition	$F(2, 295) = 5.73, p = .004, \eta^2 = .01$
Condition × quiz	$F(4, 590) = 1.10, p = .354$
Condition within geography	$F(2, 295) = 5.48, p = .005, \eta^2 = .04$
Condition within spelling	$F(2, 295) = 5.20, p = .006, \eta^2 = .03$
Condition within math	$F(2, 295) = 3.08, p = .047, \eta^2 = .02$

QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST	Total
Geography	*M* = 25.04, SD = 19.07	*M* = 19.23, SD = 11.11	*M* = 25.42, SD = 13.18	*M* = 23.19, SD = 15.05
Spelling	*M* = 24.30, SD = 16.12	*M* = 19.59, SD = 11.02	*M* = 25.49, SD = 13.46	*M* = 23.10, SD = 13.87
Math	*M* = 20.54, SD = 13.00	*M* = 17.81, SD = 11.18	*M* = 22.04, SD = 12.34	*M* = 20.11, SD = 12.28

Total	*M* = 69.88, SD = 41.30	*M* = 56.63, SD = 30.95	*M* = 72.95, SD = 35.75	*M* = 66.40, SD = 36.79

Goal accuracy

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 590) =59.55, p < .001, \eta^2 = .17$
Condition	$F(2, 295) = 3.20, p = .042, \eta^2 = .02$
Condition × quiz	$F(4, 590) = 2.00, p = .093, \eta^2 = .01$
Condition within geography	$F(2, 295) = 2.14, p = .119, \eta^2 = .01$
Condition within spelling	$F(2, 295) = 2.07, p = .129, \eta^2 = .01$
Condition within math	$F(2, 295) = 3.58, p = .029, \eta^2 = .02$

QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST	Total
Geography	*M* = -.09, SD = 11.65	*M* = .88, SD = 10.18	*M* = -2.46, SD = 13.07	*M* = -.54, SD = 11.73
Spelling	*M* = -4.32, SD = 13.71	*M* = -1.06, SD = 9.89	*M* = -2.79, SD = 10.10	*M* = -2.71, SD = 11.40
Math	*M* = -10.36, SD = 15.53	*M* = -5.32, SD = 14.00	*M* = -10.02, SD = 15.19	*M* = -8.54, SD = 15.04
Total	*M* = -14.78, SD = 34.02	*M* = -5.50, SD = 27.22	*M* = -15.27, SD = 30.84	*M* = -11.79, SD = 31.02

Output

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 590) = 94.87, p < .001, \eta^2 = .24$
Condition	$F(2, 295) = 2.37, p = .096, \eta^2 = .02$
Condition × quiz	$F(4, 590) = 3.09, p = .016, \eta^2 = .02$
Condition within geography	$F(2, 295) = 2.30, p = .102, \eta^2 = .02$
Condition within spelling	$F(2, 295) = 3.76, p = .024, \eta^2 = .02$
Condition within math	$F(2, 295) = 2.05, p = .130, \eta^2 = .01$

QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST	Total
Geography	*M* = 23.72, SD = 14.10	*M* = 20.11, SD = 10.20	*M* = 22.96, SD = 13.08	*M* = 22.24, SD = 12.61
Spelling	*M* = 19.21, SD = 12.30	*M* = 18.50, SD = 10.03	*M* = 22.70, SD = 12.21	*M* = 20.12, SD = 11.66
Math	*M* = 9.95, SD = 8.26	*M* = 12.36, SD = 9.13	*M* = 11.98, SD = 9.61	*M* = 11.43, SD = 9.05
Total	*M* = 52.88, SD = 23.59	*M* = 50.96, SD = 18.70	*M* = 57.64, SD = 24.20	*M* = 53.80, SD = 22.37

Ancillary scoring measures

Minimum qualification

Percent of participants meeting the minimum requirement (obtaining at least 10 correct answers on each task): Control 63%, Time-first 69%, Goals-first 64%; Logistic regression: Time-first vs. control: $b = .30$, Wald $\chi^2(1) = .99$, $p = .319$; Goals-first vs. time-first: $b = .23$, Wald $\chi^2(1) = .57$, $p = .809$

Lottery qualification

- Percent of participants who qualified for the bonus lottery by earning scores in the top 20% (> = 120 points): Control 23% vs. Time-first 19% vs. Goals-first 28%; Logistic regression: Time-first vs. control: $b = -.27$, Wald $\chi^2(1) = .59$, $p = .444$; Goals-first vs. control: $b = .29$, Wald $\chi^2(1) = .48$, $p = .487$

Time budgeting and use

Time budgeting (time budgeting conditions only)

Time allocated to each task (minutes)

QUIZ	TIME-FIRST	GOALS-FIRST	ANOVA
Geography	$M = 2.22$, SD = .59	$M = 2.22$, SD = .60	$F(1, 197) = .006$, $p = .937$
Spelling	$M = 2.14$, SD = .51	$M = 2.22$, SD = .47	$F(1, 197) = 1.53$, $p = .217$
Math	$M = 2.63$, SD = .70	$M = 2.60$, SD = .65	$F(1, 197) = .11$, $p = .743$

Regressions of time allocated on time spent for each task

QUIZ	TIME-FIRST	GOALS-FIRST
Geography	$\beta = .03$, $t(99) = .30$, $p = .764$	$\beta = .20$, $t(96) = 1.99$, $p = .049$, $R^2_{adj} = .03$
Spelling	$\beta = .10$, $t(99) = 1.00$, $p = .319$	$\beta = .17$, $t(96) = 1.64$, $p = .104$, $R^2_{adj} = .02$
Math	$\beta = .03$, $t(99) = .26$, $p = .799$	$\beta = .17$, $t(96) = 1.73$, $p = .087$, $R^2_{adj} = .02$

Time spent on quizzes (seconds)

STORE	CONTROL	TIME-FIRST	GOALS-FIRST	Total
Geography	$M = 159.51$, SD = 91.45	$M = 152.45$, SD = 89.74	$M = 148.33$, SD = 61.54	$M = 153.44$, SD = 82.03
Spelling	$M = 101.44$, SD = 55.96	$M = 95.97$, SD = 48.17	$M = 122.51$, SD = 65.25	$M = 106.52$, SD = 57.76
Math	$M = 75.14$, SD = 60.74	$M = 88.20$, SD = 62.34	$M = 86.56$, SD = 64.01	$M = 83.32$, SD = 62.43

Time spent on waiting page (seconds)

- $M_{control}$ = 70.28, SD = 95.45 vs. $M_{time\text{-}first}$ = 71.44, SD = 85.28; vs. $M_{goals\text{-}first}$ = 53.84, SD = 88.83; $F(2, 295) = 1.18$, $p = .308$

EXPERIMENT 4: SUPPLEMENTAL ANALYSES

Multiple goal achievement

Repeated-measures logistic regression with time budget condition as a dummy-coded between-subjects factor (Time-first = 1, Control = 0), store order as a dummy-coded between-subjects factor (Random order = 0, Chosen order = 1), store as a dummy-coded within-subjects factor (Store 1 = 0, Store 2 = 1), and goal achievement for each store as the dependent variable (failure = 0; achievement =1)

VARIABLE	PARAMETER ESTIMATE
Store	b = -.21, Wald $\chi^2(1)$ = .39, p = .531
Time budget	b = .72, Wald $\chi^2(1)$ = 3.61, p = .058, OR = 2.06
Store order	b = .56, Wald $\chi^2(1)$ = 2.80, p = .094, OR = 1.80
Time budget × Store	b = -.62, Wald $\chi^2(1)$ = 1.68, p = .195, OR = .54
Time budget × Store order	b = -.67, Wald $\chi^2(1)$ = 1.78, p = .183, OR = .51
Store order × Store	b = -.74, Wald $\chi^2(1)$ = 3.06, p = .080, OR = .48
Time budget × Store order × Store	b = 1.22, Wald $\chi^2(1)$ = 3.96, p = .047, OR = 3.38

Achievement of each goal by condition

STORE	STORE ORDER	CONTROL	TIME-FIRST	Total	Logistic regression
Store 1	RANDOM ORDER	52%	69%	61%	
	CHOSEN ORDER	66%	67%	66%	
	Total	60%	68%	64%	b = .34, Wald $\chi^2(1)$ = 1.89, p = .17, OR = 1.40
Store 2	RANDOM ORDER	47%	49%	48%	
	CHOSEN ORDER	43%	59%	51%	
	Total	44%	55%	50%	b = .42, Wald $\chi^2(1)$ = 3.15, p = .076, OR = 1.53
Amazon	RANDOM ORDER	50%	61%	55%	
	CHOSEN ORDER	60%	60%	60%	
	Total	56%	60%	58%	b = .19, Wald $\chi^2(1)$ = .61, p = .435, OR = 1.21
Target	RANDOM ORDER	48%	51%	53%	

	CHOSEN ORDER	49%	66%	57%	
	Total	49%	62%	56%	b = .56, Wald $\chi^2(1)$ = 5.44, p = .02, OR = 1.75

Achievement of both goals

	CONTROL	TIME-FIRST	Total	Logistic regression
RANDOM ORDER	29%	38%	34%	b = .38, Wald $\chi^2(1)$ = .94, p = .334
CHOSEN ORDER	35%	46%	41%	b = .44, Wald $\chi^2(1)$ = 1.90, p = .168, OR = 1.55
Total	33%	42%	38%	b = .41, Wald $\chi^2(1)$ = 2.83, p = .093, OR = 1.51

Goal setting

Final goals (adjusted for outliers)

2 (time budget: control vs. time-first, between subjects) x 2 (store order: random vs. chosen, between subjects) x 2 (store: Amazon vs. Target, within subjects) mixed ANOVA

EFFECT	TEST
Store	$F(1, 282) = 61.93$, $p < .001$, $\eta^2 = .17$
Time budget	$F(1, 282) = 6.02$, $p = .015$, $\eta^2 = .02$
Store order	$F(1, 282) = .17$, $p = .681$
Time budget × store	$F(1, 282) = 13.04$, $p < .001$, $\eta^2 = .04$
Store order × store	$F(1, 282) = .04$, $p = .841$
Time budget × store order	$F(1, 282) = .06$, $p = .814$
Time budget × store order × store	$F(1, 282) = .59$, $p = .442$
Time budget within Amazon	$F(1, 282) = .79$, $p = .375$
Time budget within Target	$F(1, 282) = 16.26$, $p < .001$, $\eta^2 = .05$

STORE	STORE ORDER	CONTROL	TIME-FIRST	Total
Amazon	RANDOM ORDER	M = 7.22, SD = 4.81	M = 6.75, SD = 4.70	M = 6.98, SD = 4.74
	CHOSEN ORDER	M = 7.41, SD = 4.98	M = 6.88, SD = 4.36	M = 7.14, SD = 4.67
Target	RANDOM ORDER	M = 6.53, SD = 4.52	M = 4.43, SD = 2.47	M = 5.45, SD = 3.75
	CHOSEN ORDER	M = 6.51, SD = 4.63	M = 4.92, SD = 3.20	M = 5.70, SD = 4.04
Total	RANDOM ORDER	M = 13.76, SD = 8.81	M = 11.18, SD = 6.54	M = 12.44, SD = 7.80
	CHOSEN ORDER	M = 13.93, SD = 9.22	M = 11.80, SD = 7.01	M = 12.84, SD = 8.22

	Total	M = 13.86, SD = 9.02	M = 11.54, SD = 6.80	M = 12.67, SD = 8.04

Outlier adjustment

26 goals (4.55% of the total 572) exceeded the limit (of 20) and were recoded as 20.

Raw goals (not adjusted for outliers)

2 (time budget: control vs. time-first, between subjects) x 2 (store order: random vs. chosen, between subjects) x 2 (store: Amazon vs. Target, within subjects) mixed ANOVA

EFFECT	TEST
Store	$F(1, 282) = 3.54, p = .061, \eta^2 = .01$
Time budget	$F(1, 282) = 5.96, p = .015, \eta^2 = .08$
Store order	$F(1, 282) = .53, p = .468$
Time budget × store	$F(1, 282) = 4.31, p = .039, \eta^2 = .01$
Store order × store	$F(1, 282) = .74, p = .389$
Time budget × store order	$F(1, 282) = .09, p = .768$
Time budget × store order × store	$F(1, 282) = .34, p = .559$
Time budget within Amazon	$F(1, 282) = 2.04, p = .154, \eta^2 = .01$
Time budget within Target	$F(1, 282) = 6.77, p = .010, \eta^2 = .02$

STORE	STORE ORDER	CONTROL	TIME-FIRST	Total
Amazon	RANDOM ORDER	M = 7.91, SD = 7.15	M = 6.75, SD = 4.70	M = 7.32, SD = 6.02
	CHOSEN ORDER	M = 8.06, SD = 8.34	M = 7.00, SD = 4.83	M = 7.52, SD = 6.78
Target	RANDOM ORDER	M = 7.22, SD = 7.02	M = 4.43, SD = 2.47	M = 5.79, SD = 5.38
	CHOSEN ORDER	M = 8.96, SD = 18.95	M = 4.98, SD = 3.52	M = 6.93, SD = 13.62
Total	RANDOM ORDER	M = 15.14, SD = 13.83	M = 11.18, SD = 6.54	M = 13.11, SD = 10.87
	CHOSEN ORDER	M = 17.02, SD = 24.43	M = 11.98, SD = 7.56	M = 14.46, SD = 18.07
	Total	M = 16.24, SD = 20.67	M = 11.64, SD = 7.14	M = 13.90, SD = 15.48

Goal accuracy

2 (time budget: control vs. time-first, between subjects) x 2 (store order: random vs. chosen, between subjects) x 2 (store: Store 1 vs. Store 2, within subjects) mixed ANOVA

EFFECT	TEST
Store	$F(1, 282) = 6.56, p = .011, \eta^2 = .02$
Time budget	$F(1, 282) = 9.33, p = .002, \eta^2 = .03$
Store order	$F(1, 282) = .02, p = .876$
Time budget × store	$F(1, 282) = 3.43, p = .065, \eta^2 = .01$

Store order × store	$F(1, 282) = .04$, $p = .840$
Time budget × store order	$F(1, 282) = .43$, $p = .515$
Time budget × store order × store	$F(1, 282) = 1.25$, $p = .265$
Time budget within Store 1	$F(1, 282) = 4.40$, $p = .037$, $\eta^2 = .02$
Time budget within Store 2	$F(1, 282) = 8.36$, $p = .004$, $\eta^2 = .03$

STORE	STORE ORDER	CONTROL	TIME-FIRST	Total
Store 1	RANDOM ORDER	$M = -1.09$, SD = 2.62	$M = -.30$, SD = 2.73	$M = -.68$, SD = 2.69
	CHOSEN ORDER	$M = -1.16$, SD = 3.73	$M = -.47$, SD = 2.36	$M = -.81$, SD = 3.12
Store 2	RANDOM ORDER	$M = -2.10$, SD = 6.37	$M = -.89$, SD = 4.52	$M = -1.48$, SD = 5.51
	CHOSEN ORDER	$M = -2.71$, SD = 5.13	$M = -.29$, SD = 4.95	$M = -1.48$, SD = 5.17
Total	RANDOM ORDER	$M = -3.19$, SD = 7.67	$M = -1.18$, SD = 5.93	$M = -2.16$, SD = 6.88
	CHOSEN ORDER	$M = -3.87$, SD = 7.88	$M = -.76$, SD = 6.18	$M = -2.29$, SD = 7.21
	Total	$M = -3.59$, SD = 7.77	$M = -.94$, SD = 6.06	$M = -2.23$, SD = 7.07

Output

2 (time budget: control vs. time-first, between subjects) x 2 (store order: random vs. chosen, between subjects) x 2 (store: Store 1 vs. Store 2, within subjects) mixed ANOVA

EFFECT	TEST
Store	$F(1, 282) = 13.70$, $p < .001$, $\eta^2 = .05$
Time budget	$F(1, 282) = .08$, $p = .783$
Store order	$F(1, 282) = .13$, $p = .720$
Time budget × store	$F(1, 282) = .27$, $p = .607$
Store order × store	$F(1, 282) = 1.19$, $p = .275$
Time budget × store order	$F(1, 282) = 1.10$, $p = .295$
Time budget × store order × store	$F(1, 282) = .65$, $p = .420$
Time budget within Store 1	$F(1, 282) = .01$, $p = .909$
Time budget within Store 2	$F(1, 282) = .30$, $p = .582$

STORE	STORE ORDER	CONTROL	TIME-FIRST	Total
Store 1	RANDOM ORDER	$M = 5.64$, SD = 4.59	$M = 5.44$, SD = 3.31	$M = 5.54$, SD = 3.97
	CHOSEN ORDER	$M = 5.96$, SD = 4.07	$M = 6.05$, SD = 4.11	$M = 6.01$, SD = 4.08
Store 2	RANDOM ORDER	$M = 4.93$, SD = 4.57	$M = 4.56$, SD = 3.57	$M = 4.74$, SD = 4.07
	CHOSEN ORDER	$M = 4.10$, SD = 3.54	$M = 4.99$, SD = 3.99	$M = 4.55$, SD = 3.79

Total	RANDOM ORDER	$M = 10.57$, SD = 6.54	$M = 10.00$, SD = 4.66	$M = 10.28$, SD = 5.64
	CHOSEN ORDER	$M = 10.06$, SD = 6.24	$M = 11.04$, SD = 6.62	$M = 10.56$, SD = 6.44
	Total	$M = 10.27$, SD = 6.35	$M = 10.60$, SD = 5.89	$M = 10.44$, SD = 6.11

Subjective well-being

Self-efficacy

2 (time budget) x 2 (store order) between-subjects ANOVA

EFFECT	TEST
Time budget	$F(1, 282) = 2.18$, $p = .141$, $\eta^2 = .01$
Store order	$F(1, 282) = 1.91$, $p = .168$, $\eta^2 = .01$
Time budget × store order	$F(1,282) = .20$, $p = .657$

	CONTROL	TIME-FIRST	Total
RANDOM ORDER	$M = 4.98$, SD = 1.47	$M = 4.79$, SD = 1.68	$M = 4.88$, SD = 1.58
CHOSEN ORDER	$M = 5.33$, SD = 1.48	$M = 4.96$, SD = 1.67	$M = 5.14$, SD = 1.58
Total	$M = 5.19$, SD = 1.48	$M = 4.89$, SD = 1.67	$M = 5.03$, SD = 1.58

Positive affect

2 (time budget) x 2 (store order) between-subjects ANOVA

EFFECT	TEST
Time budget	$F(1, 282) = .153$, $p = .696$
Store order	$F(1, 282) = .814$, $p = .398$
Time budget × store order	$F(1, 282) = 191$, $p = .168$, $\eta^2 = .01$

	CONTROL	TIME-FIRST	Total
RANDOM ORDER	$M = 3.05$, SD = 1.16	$M = 2.80$, SD = 1.17	$M = 2.92$, SD = 1.17
CHOSEN ORDER	$M = 2.73$, SD = 1.27	$M = 2.87$, SD = 1.07	$M = 2.80$, SD = 1.17
Total	$M = 2.86$, SD = 1.23	$M = 2.84$, SD = 1.11	$M = 2.85$, SD = 1.17

Negative affect

2 (time budget) x 2 (store order) between-subjects ANOVA

EFFECT	TEST
Time budget	$F(1, 282) = .09$, $p = .771$
Store order	$F(1, 282) = .18$, $p = .676$
Time budget × store order	$F(1, 282) = .62$, $p = .433$

	CONTROL	TIME-FIRST	Total
RANDOM ORDER	$M = 2.00$, SD = 1.03	$M = 1.93$, SD = 1.12	$M = 1.97$, SD = 1.07
CHOSEN ORDER	$M = 1.95$, SD = 1.16	$M = 2.09$, SD = 1.09	$M = 2.02$, SD = 1.12
Total	$M = 1.97$, SD = 1.11	$M = 2.03$, SD = 1.10	$M = 2.00$, SD = 1.10

Ancillary scoring measures

Minimum qualification

Percent of participants meeting the minimum requirement (selecting at least 2 products from each store):

	CONTROL	TIME-FIRST	Logistic regression
RANDOM ORDER	71%	82%	
CHOSEN ORDER	79%	82%	
Total	76%	82%	$b = .39$, Wald $\chi^2(1) = 1.80$, $p = .181$, OR = 1.48

Lottery qualification

Percent of participants who qualified for the bonus lottery by earning scores in the top 20% (>= 15)

	CONTROL	TIME-FIRST	Logistic regression
RANDOM ORDER	21%	16%	
CHOSEN ORDER	20%	24%	
Total	20%	21%	$b = .03$, Wald $\chi^2(1) = 01$, $p = .908$

Time budgeting and use

Time budgeting (time-first condition only)

Time allocated to each store (minutes):

	RANDOM ORDER	CHOSEN ORDER
Amazon	$M = 3.95$, SD = .85	$M = 3.91$, SD = .78
Target	$M = 3.05$, SD = .85	$M = 3.09$, SD = .78

Regressions of time allocated on time spent for each store (time-first conditions only)

	RANDOM ORDER	CHOSEN ORDER
Amazon	$\beta = .05$, $t(59) = .38$, $p = .705$	$\beta = .27$, $t(83) = 2.57$, $p = .012$, $R^2_{adj} = .06$
Target	$\beta = .06$, $t(59) = .47$, $p = .639$	$\beta = .25$, $t(83) = 2.35$, $p = .021$, $R^2_{adj} = .05$

Time spent shopping (seconds)

STORE	STORE ORDER	CONTROL	TIME-FIRST
Store 1	RANDOM ORDER	$M = 225.07$, SD = 103.19	$M = 226.11$, SD = 84.60
	CHOSEN ORDER	$M = 215.39$, SD = 97.36	$M = 216.25$, SD = 84.96
Store 2	RANDOM ORDER	$M = 171.14$, SD = 93.89	$M = 167.04$, SD = 80.23
	CHOSEN ORDER	$M = 136.87$, SD = 75.09	$M = 154.49$, SD = 75.67
Amazon	RANDOM ORDER	$M = 199.23$, SD = 113.70	$M = 224.80$, SD = 92.11
	CHOSEN ORDER	$M = 197.16$, SD = 102.25	$M = 198.03$, SD = 91.66
Target	RANDOM ORDER	$M = 196.98$, SD = 89.52	$M = 168.35$, SD = 72.55
	CHOSEN ORDER	$M = 155.10$, SD = 83.00	$M = 172.71$, SD = 78.41

Time spent on waiting page (seconds)

2 (time budget) x 2 (store order) between-subjects ANOVA

EFFECT	TEST
Time budget	$F(1, 282) = 2.34$, $p = .128$, $\eta^2 = .01$
Store order	$F(1, 282) = 8.19$, $p = .005$, $\eta^2 = .03$
Time budget × store order	$F(1, 282) = .06$, $p = .813$

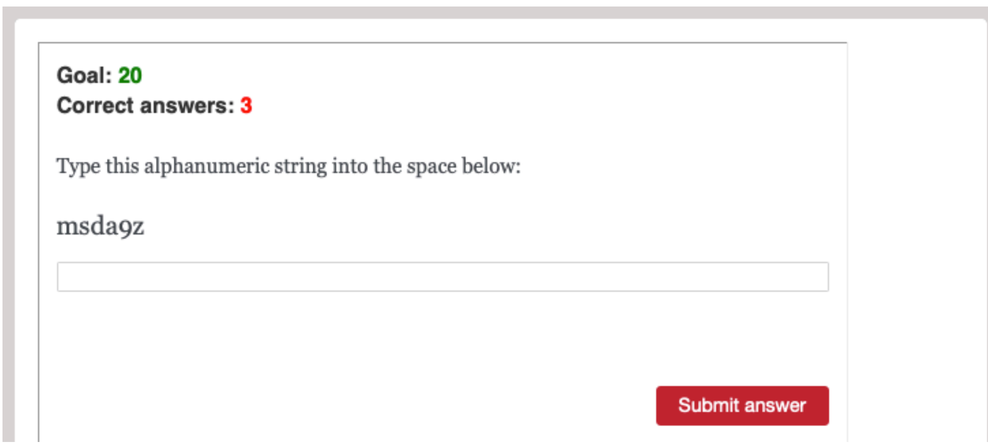
	CONTROL	TIME-FIRST
RANDOM ORDER	M = 35.95, SD = 55.39	M = 24.51, SD = 51.53
CHOSEN ORDER	M = 63.38, SD = 94.91	M = 47.75, SD = 74.97

EXPERIMENT 5: STIMULI AND SUPPLEMENTAL ANALYSES

Stimuli

Transcription task example

Note, the survey was programmed to prevent participants from copy/pasting answers into the response box.



Goal setting page stimuli

All participants were randomly assigned to see either the transcription or the spelling task first on the goal setting page (examples below show time budgeting conditions).

Goal setting

Final goals (adjusted for outliers)

Between (condition) x within (task) mixed ANOVA

EFFECT	TEST
Task	$F(1, 314) = 5.44$, $p = .020$, $\eta^2 = .04$
Condition	$F(2, 314) = 5.47$, $p = .005$, $\eta^2 = .03$
Condition × task	$F(2, 314) = .19$, $p = .828$
Condition within transcription	$F(2, 314) = 4.45$, $p = .012$, $\eta^2 = .03$
Condition within spelling	$F(2, 314) = 5.29$, $p = .005$, $\eta^2 = .03$

TASK	CONTROL	CHOSEN TIME	ASSIGNED TIME	Total
Transcription	$M = 24.75$, SD = 15.85	$M = 22.43$, SD = 14.55	$M = 18.86$, SD = 13.09	$M = 22.01$, SD = 14.70
Spelling	$M = 23.83$, SD = 14.34	$M = 20.70$, SD = 14.40	$M = 17.67$, SD = 12.76	$M = 20.74$, SD = 14.04
Total	$M = 48.58$, SD = 28.93	$M = 43.13$, SD = 27.04	$M = 36.53$, SD = 23.82	$M = 42.74$, SD = 27.05

Outlier adjustment

Twenty-two goals (3.47% of the total 634) exceeded the limit (65 answers per task) and were recoded as 65.

Raw goals (not adjusted for outliers)

Between (condition) x within (task) mixed ANOVA

EFFECT	TEST
Task	$F(1, 314) = 2.37$, $p = .124$, $\eta^2 = .01$
Condition	$F(2, 314) = 2.76$, $p = .065$, $\eta^2 = .02$
Condition × task	$F(2, 314) = .66$, $p = .520$
Condition within transcription	$F(2, 314) = 2.38$, $p = .095$, $\eta^2 = .01$
Condition within spelling	$F(2, 314) = 2.10$, $p = .125$, $\eta^2 = .01$

TASK	CONTROL	CHOSEN TIME	ASSIGNED TIME	Total
Transcription	$M = 25.87$, SD = 19.26	$M = 24.71$, SD = 26.85	$M = 19.84$, SD = 17.22	$M = 23.46$, SD = 21.53
Spelling	$M = 24.63$, SD = 17.22	$M = 21.23$, SD = 16.41	$M = 19.40$, SD = 22.49	$M = 21.76$, SD = 19.00
Total	$M = 50.50$, SD = 35.09	$M = 45.94$, SD = 36.98	$M = 39.24$, SD = 33.60	$M = 45.22$, SD = 35.42

Time budgeting and use

Time budgeting (time-budgeting conditions only)

- Time spent on time budgeting page

- $M_{\text{chosen time}}$ = 32.56, SD = 23.67 vs. $M_{\text{assigned time}}$ = 21.92, SD = 7.99

The chosen time allocations ($M_{\text{transcription}}$ = 2.50, SD = .66; M_{spelling} = 2.50, SD = .66) differed significantly from assigned time allocations t-test vs. assigned transcription time value of 3: $t(102) = -7.78$, $p < .001$; t-test vs. assigned spelling time value of 2: $t(102) = -7.78$, $p < .001$).

Examining the distribution of chosen time allocations (below) suggests that for a majority of participants in the assigned-time condition, the assigned time budget was inconsistent with their personal preferences.

Transcription (minutes allocated)	Spelling (minutes allocated)	Percent of participants (chosen-time condition)
1	4	4.9
2	3	39.8
2.5	2.5	13.6
3	2	35.9
4	1	5.8

Time spent setting goals

- M_{control} = 28.22, SD = 16.22 vs. $M_{\text{chosen time}}$ = 31.10, SD = 23.65 vs. $M_{\text{assigned time}}$ = 36.51, SD = 25.33; $F(2, 314) = 3.89$, $p = .021$, $\eta^2 = .02$)

EXPERIMENT 6: SUPPLEMENTAL ANALYSES

Multiple goal achievement

Achievement of each goal by condition

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	77%	80%	78%
	2 GOALS	86%	87%	87%
	3 GOALS	79%	82%	80%
	Total	81%	83%	82%
Spelling	2 GOALS	37%	55%	46%
	3 GOALS	48%	67%	57%
	Total	42%	61%	51%
Math	3 GOALS	23%	30%	26%

Achievement of all goal(s) (1, 2, or 3 goals)

	CONTROL	TIME-FIRST	Total	Logistic regression
1 GOAL	77%	80%	78%	b = .15, Wald $\chi^2(1)$ = .19, p = .666
2 GOALS	35%	51%	43%	b = .69, Wald $\chi^2(1)$ = 5.77, p = .016, OR = 2
3 GOALS	20%	26%	23%	b = .31, Wald $\chi^2(1)$ = .79, p = .375, OR = 1.36
Total	44%	53%	49%	b = .42, Wald $\chi^2(1)$ = 5.13, p = .024, OR = 1.52

Goal setting

Final goals (adjusted for outliers)

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 52.86, p < .001, \eta^2 = .14$
Time budget	$F(1, 598) = 20.81, p < .001, \eta^2 = .03$
Time budget × goals	$F(2, 598) = 4.45, p = .012, \eta^2 = .01$
Time budget within 1 goal	$F(1, 598) = 1.09, p = .297$
Time budget within 2 goals	$F(1, 598) = 3.38, p = .066, \eta^2 = .01$
Time budget within 3 goals	$F(1, 598) = 24.44, p < .001, \eta^2 = .04$

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	M = 42.02, SD = 22.57	M = 37.66, SD = 22.91	M = 39.86, SD = 22.79
	2 GOALS	M = 29.36, SD = 14.47	M = 24.27, SD = 12.12	M = 26.81, SD = 13.56
	3 GOALS	M = 28.53, SD = 15.72	M = 20.67, SD = 13.15	M = 24.88, SD = 15.07
Spelling	2 GOALS	M = 26.64, SD = 14.07	M = 23.93, SD = 13.22	M = 25.29, SD = 13.69
	3 GOALS	M = 27.47, SD = 16.14	M = 20.46, SD = 13.03	M = 24.22, SD = 15.15
Math	3 GOALS	M = 25.39, SD = 16.00	M = 18.82, SD = 12.32	M = 22.35, SD = 14.74
Total	1 GOAL	M = 42.02, SD = 22.57	M = 37.66, SD = 22.91	M = 39.86, SD = 22.79
	2 GOALS	M = 56.00, SD = 25.61	M = 48.20, SD = 23.08	M = 52.10, SD = 24.63
	3 GOALS	M = 81.39, SD = 44.67	M = 59.94, SD = 35.52	M = 71.44, SD = 41.97
	Total	M = 59.78, SD = 36.30	M = 48.10, SD = 28.80	M = 54.10, SD = 33.35

Outlier adjustment

Seventeen goals (1.42% of the total 1,194) exceeded the limit and were recoded. Questions were scaled across goal-number conditions to give participants equivalent opportunity to respond (1-goal condition: 96; 2-goal condition: 80 per task; 3-goal condition: 65 per task).

Raw goals (not adjusted for outliers)

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 42.08$, $p < .001$, $\eta^2 = .12$
Time budget	$F(1, 598) = 19.19$, $p < .001$, $\eta^2 = .03$
Time budget × goals	$F(2, 598) = 3.91$, $p = .021$, $\eta^2 = .01$
Time budget within 1 goal	$F(1, 598) = 1.51$, $p = .219$
Time budget within 2 goals	$F(1, 598) = 2.43$, $p = .120$
Time budget within 3 goals	$F(1, 598) = 22.37$, $p < .001$, $\eta^2 = .04$

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	$M = 44.11$, SD = 30.19	$M = 38.05$, SD = 24.02	$M = 41.11$, SD = 27.41
	2 GOALS	$M = 29.36$, SD = 14.47	$M = 24.27$, SD = 12.12	$M = 26.81$, SD = 13.56
	3 GOALS	$M = 29.06$, SD = 17.31	$M = 21.06$, SD = 14.88	$M = 25.35$, SD = 16.67
Spelling	2 GOALS	$M = 26.64$, SD = 14.07	$M = 23.93$, SD = 13.22	$M = 25.29$, SD = 13.69
	3 GOALS	$M = 30.60$, SD = 32.39	$M = 20.84$, SD = 14.78	$M = 26.07$, SD = 26.16
Math	3 GOALS	$M = 25.73$, SD = 17.16	$M = 19.27$, SD = 14.39	$M = 22.73$, SD = 16.22
Total	1 GOAL	$M = 44.11$, SD = 30.19	$M = 38.05$, SD = 24.02	$M = 41.11$, SD = 27.41
	2 GOALS	$M = 56.00$, SD = 25.61	$M = 48.20$, SD = 23.08	$M = 52.10$, SD = 24.63
	3 GOALS	$M = 85.38$, SD = 56.72	$M = 61.17$, SD = 41.41	$M = 74.15$, SD = 51.52
	Total	$M = 61.83$, SD = 43.54	$M = 48.61$, SD = 31.48	$M = 55.40$, SD = 38.69

Goal accuracy

2 (condition) x 3 (goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 68.59$, $p < .001$, $\eta^2 = .18$
Time budget	$F(1, 598) = 19.37$ $p < .001$, $\eta^2 = .03$
Time budget × goals	$F(2, 598) = 6.20$, $p = .002$, $\eta^2 = .02$
Time budget within 1 goal	$F(1, 598) = .38$, $p = .539$
Time budget within 2 goals	$F(1, 598) = 2.71$, $p = .100$, $\eta^2 = .00$

Time budget within 3 goals	$F(1, 598) = 27.78$, $p < .001$, $\eta^2 = .04$

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	$M = 3.34$, SD = 18.78	$M = 5.57$, SD = 20.00	$M = 4.45$, SD = 19.38
	2 GOALS	$M = 1.45$, SD = 12.34	$M = 1.46$, SD = 9.90	$M = 1.45$, SD = 11.16
	3 GOALS	$M = -1.94$, SD = 10.83	$M = .11$, SD = 13.25	$M = -0.99$, SD = 12.02
Spelling	2 GOALS	$M = -11.81$, SD = 16.04	$M = -5.76$, SD = 12.24	$M = -8.79$, SD = 14.55
	3 GOALS	$M = -14.32$, SD = 18.80	$M = -5.07$, SD = 12.20	$M = -10.03$, SD = 16.69
Math	3 GOALS	$M = -19.62$, SD = 18.82	$M = -11.09$, SD = 15.34	$M = -15.66$, SD = 17.77
Total	1 GOAL	$M = 3.34$, SD = 18.78	$M = 5.57$, SD = 20.00	$M = 4.45$, SD = 19.38
	2 GOALS	$M = -10.37$, SD = 20.57	$M = -4.31$, SD = 15.90	$M = -7.34$, SD = 18.58
	3 GOALS	$M = -35.87$, SD = 39.93	$M = -16.04$, SD = 33.38	$M = -26.68$, SD = 38.25
	Total	$M = -14.28$, SD = 32.48	$M = -4.44$, SD = 25.31	$M = -9.49$, SD = 29.60

Output

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = .04$, $p = .961$
Time budget	$F(1, 598) = 1.57$, $p = .211$
Time budget × goals	$F(2, 598) = .01$, $p = .988$
Time budget within 1 goal	$F(1, 598) = .75$, $p = .388$
Time budget within 2 goals	$F(1, 598) = .46$, $p = .499$
Time budget within 3 goals	$F(1, 598) = .40$, $p = .527$

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	$M = 45.36$, SD = 19.93	$M = 43.23$, SD = 20.75	$M = 44.31$, SD = 20.32
	2 GOALS	$M = 30.80$, SD = 15.18	$M = 25.72$, SD = 14.08	$M = 28.26$, SD = 14.83
	3 GOALS	$M = 26.59$, SD = 15.24	$M = 20.78$, SD = 12.06	$M = 23.89$, SD = 14.12
Spelling	2 GOALS	$M = 14.78$, SD = 12.20	$M = 18.17$, SD = 11.70	$M = 16.48$, SD = 12.04
	3 GOALS	$M = 13.15$, SD = 8.83	$M = 15.39$, SD = 8.95	$M = 14.19$, SD = 8.93

Math	3 GOALS	*M* = 5.78, SD = 7.12	*M* = 7.73, SD = 7.60	*M* = 6.69, SD = 7.39
Total	1 GOAL	*M* = 45.36, SD = 19.93	*M* = 43.23, SD = 20.75	*M* = 44.31, SD = 20.32
	2 GOALS	*M* = 45.58, SD = 17.47	*M* = 43.89, SD = 17.84	*M* = 44.74, SD = 17.63
	3 GOALS	*M* = 45.52, SD = 14.46	*M* = 43.90, SD = 14.86	*M* = 44.77, SD = 14.63
	Total	*M* = 45.49, SD = 17.38	*M* = 43.66, SD = 18.05	*M* = 44.60, SD = 17.72

Process: Time trade-off consideration

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(1, 392) = .93$, $p = .428$
Time budget	$F(1, 392) = 10.06$, $p = .002$, $\eta^2 = .02$
Time budget × goals	$F(1, 392) = .88$, $p = .611$

	CONTROL	TIME-FIRST	Total
2 GOALS	*M* = 4.16, SD = 1.84	*M* = 4.84, SD = 1.65	*M* = 4.50, SD = 1.78
3 GOALS	*M* = 4.11, SD = 1.99	*M* = 4.60, SD = 1.87	*M* = 4.34, SD = 1.95
Total	*M* = 4.13, SD = 1.92	*M* = 4.73, SD = 1.76	*M* = 4.42, SD = 1.86

Subjective well-being

Self-efficacy

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 33.68$, $p < .001$, $\eta^2 = .10$
Time budget	$F(1, 598) = 2.06$, $p = .152$, $\eta^2 = .00$
Time budget × goals	$F(2, 598) = .35$, $p = .704$

	CONTROL	TIME-FIRST	TOTAL
1 GOAL	*M* = 5.48, SD = 1.32	*M* = 5.68, SD = 1.30	*M* = 5.58, SD = 1.31
2 GOALS	*M* = 4.70, SD = 1.30	*M* = 4.95, SD = 1.33	*M* = 4.83, SD = 1.32
3 GOALS	*M* = 4.47, SD = 1.49	*M* = 4.50, SD = 1.46	*M* = 4.48, SD = 1.48
Total	*M* = 4.89, SD = 1.44	*M* = 5.07, SD = 1.44	*M* = 4.98, SD = 1.44

Positive affect

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 11.94, p < .001, \eta^2 = .04$
Time budget	$F(1, 598) = 2.25, p = .134, \eta^2 = .01$
Time budget × goals	$F(2, 598) = .71, p = .493$

	CONTROL	TIME-FIRST	TOTAL
1 GOAL	M = 2.68, SD = 1.16	M = 2.73, SD = 1.17	M = 2.71, SD = 1.16
2 GOALS	M = 2.33, SD = 1.04	M = 2.39, SD = 1.04	M = 2.36, SD = 1.04
3 GOALS	M = 2.05, SD = .98	M = 2.33, SD = 1.11	M = 2.18, SD = 1.04
Total	M = 2.36, SD = 1.09	M = 2.49, SD = 1.12	M = 2.42, SD = 1.10

Negative affect

2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 26.82, p < .001, \eta^2 = .08$
Time budget	$F(1, 598) = 7.83, p = .005, \eta^2 = .01$
Time budget × goals	$F(2, 598) = .10, p = .910$

	CONTROL	TIME-FIRST	TOTAL
1 GOAL	M = 1.87, SD = 1.04	M = 1.68, SD = .96	M = 1.77, SD = 1.00
2 GOALS	M = 2.25, SD = 1.09	M = 1.97, SD = .99	M = 2.11, SD = 1.05
3 GOALS	M = 2.67, SD = 1.12	M = 2.42, SD = 1.13	M = 2.55, SD = 1.13
Total	M = 2.26, SD = 1.13	M = 2.00, SD = 1.07	M = 2.14, SD = 1.10

Ancillary scoring measures

Minimum qualification

Percent of participants meeting the minimum requirement (obtaining at least 10 correct answers on each task)

	CONTROL	TIME-FIRST	Logistic regression
1 GOAL	98%	97%	$b = -.44$, Wald $\chi^2(1) = .22$, $p = .638$
2 GOALS	63%	77%	$b = .67$, Wald $\chi^2(1) = 4.58$, $p = .032$, OR = 1.96
3 GOALS	32%	39%	$b = .31$, Wald $\chi^2(1) = 1.08$, $p = .298$, OR = 1.37
Total	65%	72%	

Lottery qualification

Percent of participants who qualified for the bonus lottery by earning scores in the top 20% (calculated separately for each goal number condition: 1 goal = 100, 2 goals = 86, 3 goals = 70)

	CONTROL	TIME-FIRST	Logistic regression
1 GOAL	23%	24%	b = .03, Wald $\chi^2(1)$ = .001, p = .939
2 GOALS	18%	22%	b = .24, Wald $\chi^2(1)$ = .45, p = 502
3 GOALS	17%	22%	b = .33, Wald $\chi^2(1)$ = .80, p = .372
Total	65%	72%	

Time budgeting and use

Time budgeting (time-first condition only)

Time allocated to each task (minutes):

	1 GOAL	2 GOALS	3 GOALS
Transcription	M = 6.00, SD = 0	M = 3.01, SD = .70	M = 1.92, SD = .72
Spelling		M = 2.99, SD = .70	M = 2.07, SD = .79
Math			M = 2.22, SD = .75

Regressions of time allocated on time spent for each task (time-first condition only; 1 goal not tested given 0 variance in time allocation of 6 minutes)

	2 GOALS	3 GOALS
Transcription	β = .20, $t(99)$ = 2.06, p = .042, R^2_{adj} = .03	β = .16, $t(88)$ = 1.49, p = .141, R^2_{adj} = .01
Spelling	β = .23, $t(99)$ = 2.36, p = .020, R^2_{adj} = .04	β = .07, $t(88)$ = .61, p = .543
Math		β = -.07, $t(88)$ = -.68, p = .498

Time spent on tasks (seconds)

TASK	GOALS	CONTROL	TIME-FIRST
Transcription	1	M = 281.62, SD = 96.36	M = 279.44, SD = 102.65
	2	M = 207.34, SD = 98.19	M = 166.56, SD = 85.93
	3	M = 180.78, SD = 97.59	M = 142.34, SD = 81.12
Spelling	2	M = 105.59, SD = 72.58	M = 130.04, SD = 68.08

	3	M = 100.64, SD = 60.78	M = 115.09, SD = 60.26
Math	3	M = 48.59, SD = 53.25	M = 68.61, SD = 60.41

Time spent on waiting page (seconds)

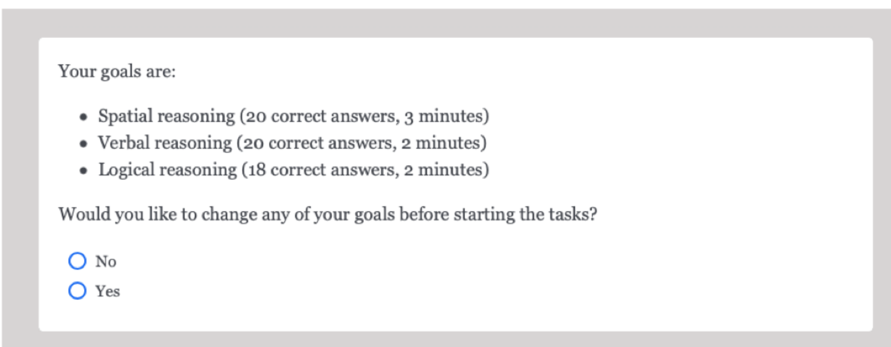
2 (time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 598) = 25.52, p < .001, \eta^2 = .08$
Time budget	$F(1, 598) = 1.29, p = .256$
Time budget × goals	$F(2, 598) = .37, p = .689$

	CONTROL	TIME-FIRST
1 GOAL	M = 75.11, SD = 95.27	M = 78.43, SD = 104.06
2 GOALS	M = 40.18, SD = 72.21	M = 54.97, SD = 76.35
3 GOALS	M = 20.16, SD = 42.13	M = 23.46, SD = 49.55

EXPERIMENT 3 FOLLOW-UP STUDY: GOAL REVISION

Stimuli : Goal revision page (goals-first condition only)



Participants and procedure

Three hundred thirty-five Amazon MTurk panelists completed the study. Eleven were excluded for failing an attention check, six for restarting the survey after seeing the practice section, and 23 for extreme values on time spent, leaving a final N = 297 (mean age = 36.19 years, 57.2% men). Participants were randomly assigned to one of three conditions: control versus time-first versus goals-first.

The design replicated experiment 3 (goal setting only), except that in the goals-first condition, participants set goals, budgeted time, and were then shown their goals and time allocation and asked if they wanted to revise their goals before starting the tasks (see stimuli above).

Goal setting

Consistent with the main experiment 3, prior to any revision, participants in the goals-first condition set higher goals (M = 73.60) than those in the time-first condition (M = 58.75), and similar to control (M = 77.71; see tables below).

Between (condition) x within (quiz) mixed ANOVA (original goals adjusted for outliers*, prior to goal revision)

EFFECT	TEST
Task	$F(2, 588) = 5.31, p = .005, \eta^2 = .02$
Condition	$F(2, 294) = 6.88, p = .001, \eta^2 = .04$
Condition × quiz	$F(4, 588) = 1.86, p = .115, \eta^2 = .01$
Condition within geography	$F(2, 294) = 8.76, p < .001, \eta^2 = .06$
Condition within spelling	$F(2, 294) = 4.80, p = .009, \eta^2 = .03$
Condition within math	$F(2, 294) = 5.33, p = .005, \eta^2 = .03$
Time-first vs. control	$F(2, 294) = 12.35, p = .001, \eta^2 = .04$
Time-first vs. goals-first	$F(2, 294) = 7.65, p = 006, \eta^2 = .03$
Goals-first vs. control	$F(2, 294) = .58, p = .448$

TASK	CONTROL	TIME-FIRST	GOALS-FIRST	TOTAL
Geography	M = 26.36, SD = 13.25	M = 18.63, SD = 12.55	M = 23.30, SD = 13.50	M = 22.71, SD = 13.44
Spelling	M = 25.99, SD = 13.00	M = 20.74, SD = 13.94	M = 26.11, SD = 14.95	M = 24.25, SD = 14.17
Math	M = 25.36, SD = 14.13	M = 19.38, SD = 12.98	M = 24.18, SD = 14.03	M = 22.93, SD = 13.91
Total	M = 77.71, SD = 37.88	M = 58.75, SD = 36.79	M = 73.60, SD = 39.16	M = 69.89, SD = 38.70

*Thirty-five goals (3.93% of the total 891) exceeded the limit (56 questions per task) and were recoded as 56.

Goal revision

Only 26% percent of participants in the goals-first condition (N = 26) chose to revise their goals (a proportion significantly below chance, one-sample binomial test $p < .001$).

Indeed, these revised goals were lower (M = 55.35; vs. control: p = .007; vs. time-first: p = .681; see table below). Notably, goals of the 74% who did not revise remained overly optimistic (M = 55.35; vs. time-first: p = .050).

Final goals, splitting goals-first condition into revised and not revised

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 586) = 3.37, p = .035, \eta^2 = .01$
Condition	$F(3, 293) = 5.23, p = .002, \eta^2 = .05$
Condition × quiz	$F(6, 586) = 1.15, p = .333$
Condition within geography	$F(3, 293) = 6.52, p < .001, \eta^2 = .06$
Condition within spelling	$F(3, 293) = 3.50, p = .016, \eta^2 = .03$
Condition within math	$F(3, 293) = 4.27, p = .006, \eta^2 = .04$

Goals-first/revised vs. control	$F(1, 293) = 7.25$, $p = .007$, $\eta^2 = .02$
Goals-first/revised vs. time-first	$F(1, 293) = .17$, $p = .681$
Goals-first/not revised vs. control	$F(1, 293) = 1.69$, $p = .195$, $\eta^2 = .01$
Goals-first/not revised vs. time-first	$F(1, 293) = 3.88$, $p = .050$, $\eta^2 = .01$

QUIZ	CONTROL	TIME-FIRST	GOALS-FIRST, REVISED	GOALS-FIRST, NOT REVISED	Total
Geography	$M = 26.36$, SD = 13.25	$M = 18.63$, SD = 12.55	$M = 18.54$, SD = 11.01	$M = 22.33$, SD = 13.92	$M = 22.06$, SD = 13.37
Spelling	$M = 25.99$, SD = 13.00	$M = 20.74$, SD = 13.94	$M = 19.12$, SD = 9.68	$M = 24.84$, SD = 15.58	$M = 23.32$, SD = 13.93
Math	$M = 25.36$, SD = 14.13	$M = 19.38$, SD = 12.98	$M = 17.69$, SD = 10.46	$M = 22.97$, SD = 14.35	$M = 22.07$, SD = 13.75
Total	$M = 77.71$, SD = 37.88	$M = 58.75$, SD = 36.79	$M = 55.35$, SD = 29.51	$M = 70.14$, SD = 40.73	$M = 67.44$, SD = 38.40

EXPERIMENT 5 FOLLOW-UP STUDY: ASSIGNED TIME BUDGETS

Participants and procedure

Three hundred and four Amazon MTurk panelists completed the study. One was excluded for failing an attention check, six for restarting the survey after seeing the practice section, and 18 for extreme values of time spent, leaving a final $N = 280$. Participants were randomly assigned to one of two conditions: control versus assigned time budget.

The design replicated experiment 2 (geography, spelling, and math quizzes, presented in random order) with the following exceptions. First, participants had a total of 9 minutes to pursue their goals, and the task incentive structure was the same as in experiment 3 (top 20% entered in the bonus lottery).

Second, in the time-first condition, participants all viewed the same suggested time allocation (3 minutes per task) and then set their goals.

Third, following goal pursuit, we measured subjective well-being. To measure self-efficacy, we asked participants, "Please rate your overall competence in the survey tasks" (1 = *Not at all competent*, 4 = *Moderately competent*, 7 = *Highly competent*). To measure positive affect, we asked, "How satisfied are you with your overall performance on the tasks?" (1 = *Very unsatisfied*, 4 = *Neither satisfied nor unsatisfied*, 7 = *Very satisfied*).

Multiple goal achievement

As predicted, budgeting time before setting goals increased the number of goals achieved ($F(1, 278) = 5.77$, $p = .017$, $\eta^2 = .02$). Compared to the control ($M = 1.76$, SD = 1.16), participants in the assigned-time condition achieved significantly more of their goals ($M = 2.07$, SD = 1.04).

Further, budgeting time first made participants more likely to achieve *all* of their multiple goals (albeit directionally; logistic regression: $b = .39$, Wald $\chi2(1) = 2.61$, $p = .106$, OR = 1.48). Compared to the control (38%), participants in the time-first condition were more likely to achieve all three of their goals (47%).

QUIZ	CONTROL	TIME-FIRST	Total	Logistic regression
Quiz 1	74%	85%	79%	$b = .64$, Wald $\chi^2(1) = 4.40$, $p = .036$, OR = 1.89
Quiz 2	60%	71%	65%	$b = .52$, Wald $\chi^2(1) = 4.13$, $p = .042$, OR = 1.68
Quiz 3	42%	51%	46%	$b = .40$, Wald $\chi^2(1) = 2.69$, $p = .101$, OR = 1.49
Geography	58%	69%	63%	$b = .50$, Wald $\chi^2(1) = 3.94$, $p = .047$, OR = 1.65
Spelling	58%	69%	63%	$b = .50$, Wald $\chi^2(1) = 3.94$, $p = .047$, OR = 1.65
Math	60%	69%	65%	$b = .38$, Wald $\chi^2(1) = 2.31$, $p = .129$, OR = 1.47

Goal setting

As predicted, budgeting time first reduced optimism bias in multiple goal setting. A mixed ANOVA revealed the predicted effect of time budgeting on goal setting (see tables below). Compared to the control ($M = 74.72$), participants in the time-first condition set lower multiple goals ($M = 59.07$).

Final goals (adjusted for outliers)

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 556) = 12.25$, $p < .001$, $\eta^2 = .04$
Condition	$F(1, 278) = 12.11$, $p = .001$, $\eta^2 = .04$
Condition × quiz	$F(2, 556) = 2.71$, $p = .067$, $\eta^2 = .01$

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Geography	$M = 23.85$, SD = 13.70	$M = 19.51$, SD = 11.75	$M = 21.74$, SD = 12.95	$F(1, 278) = 8.08$, $p = .005$, $\eta^2 = .03$
Spelling	$M = 26.98$, SD = 15.64	$M = 20.45$, SD = 12.19	$M = 23.81$, SD = 14.42	$F(1, 278) = 15.07$, $p < .001$, $\eta^2 = .05$
Math	$M = 23.88$, SD = 14.62	$M = 19.11$, SD = 11.95	$M = 21.56$, SD = 13.58	$F(1, 278) = 8.88$, $p = .003$, $\eta^2 = .03$
Total	$M = 74.72$, SD = 40.85	$M = 59.07$, SD = 33.86	$M = 67.11$, SD = 38.36	

Outlier adjustment

Ten goals (1.19% of the total 840) exceeded the limit (65 answers per quiz) and were recoded as 65.

Goal accuracy

As predicted, budgeting time first caused people to set goals that were more accurate. A mixed ANOVA revealed the predicted effect of time budgeting on discrepancy (see tables below). Compared to the control (M = -23.49), participants in the assigned-time condition showed a smaller gap between goals and output (M = -8.59).

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 556) = 80.43, p < .001, \eta^2 = .21$
Condition	$F(1, 278) = 11.86, p = .001, \eta^2 = .04$
Condition × quiz	$F(2, 556) = .42, p = .486$

QUIZ	CONTROL	TIME-FIRST	Total	Contrast
Quiz 1	M = -2.91, SD = 14.05	M = 3.26, SD = 14.17	M = .09, SD = 14.42	$F(1, 278) = 13.37, p < .001, \eta^2 = .05$
Quiz 2	M = -6.96, SD = 14.75	M = -2.91, SD = 11.43	M = -4.99, SD = 13.37	$F(1, 278) = 6.53, p = .011, \eta^2 = .02$
Quiz 3	M = -13.62, SD = 19.04	M = -8.93, SD = 14.67	M = -11.34, SD = 17.19	$F(1, 278) = 5.28, p = .022, \eta^2 = .02$
Total	M = -23.49, SD = 40.27	M = -8.59, SD = 31.28	M = -16.25, SD = 36.88	

Output

Importantly, as predicted, time budgeting did not cause people to do less. A mixed ANOVA (see tables below) revealed no effect of time budgeting. Participants in the assigned-time condition provided just as many correct answers total (M = 50.48) as those in the control (M = 51.23).

Between (condition) x within (quiz) mixed ANOVA

EFFECT	TEST
Quiz	$F(2, 556) = 72.85, p < .001, \eta^2 = .21$
Condition	$F(1, 278) = .08, p = .773$
Condition × quiz	$F(2, 556) = .23, p = .793$

QUIZ	CONTROL	TIME-FIRST	Total
Quiz 1	M = 22.42, SD = 12.76	M = 22.90, SD = 14.39	M = 22.65, SD = 13.55
Quiz 2	M = 17.37, SD = 11.71	M = 16.65, SD = 11.40	M = 17.02, SD = 11.55
Quiz 3	M = 11.44, SD = 10.86	M = 10.93, SD = 8.15	M = 11.19, SD = 9.63
Total	M = 51.23, SD = 21.47	M = 50.48, SD = 22.10	M = 50.86, SD = 21.74

Subjective well-being

Mediation analyses revealed significant indirect effects of number of goals achieved on self-efficacy (*ab* = .10, 95% CI, .02 to .21) and positive affect (*ab* = .23, 95% CI, .05 to .43). Supporting our theory, by increasing multiple goal achievement, budgeting time first increased self-efficacy and positive affect.

Measure	CONTROL	TIME-FIRST	Contrast
Self-efficacy	M = 4.95, SD = 1.34	M = 4.93, SD = 1.33	$F(1, 278) = .01$, $p = .913$
Positive affect	M = 4.35, SD =	M = 4.49, SD = 1.87	$F(1, 278) = .42$, $p = .523$

Time budgeting and use

Time spent on quizzes (seconds)

STORE	CONTROL	TIME-FIRST
Quiz 1	M = 235.40, SD = 137.91	M = 196.13, SD = 122.11
Quiz 2	M = 139.15, SD = 87.19	M = 134.40, SD = 78.48
Quiz 3	M = 88.74, SD = 84.10	M = 94.74, SD = 70.22

Time spent on waiting page (seconds)

- M_{control} = 65.34, SD = 92.85 vs. $M_{\text{assigned time}}$ = 102.26, SD = 121.93; one-way ANOVA: $F(1, 278) = 8.18$, $p = .005$, $\eta^2 = .03$

EXPERIMENT 6 FOLLOW-UP STUDY

Participants and procedure

Six hundred and fifty-six U.S. MTurk panelists completed the study. Twenty-six were excluded for failing an attention check, seventeen for restarting the survey after seeing the practice section, and forty-one for extreme values of time spent, leaving a final N = 579. Participants were randomly assigned to one of six conditions in a 3 (number of goals: 1, 2, 3) x 2 (time budget: control versus time-first) design.

The design replicated experiment 6 (goal setting only), except that the total time available scaled with the number of a goals (i.e., participants had a total of 2, 4, or 6 minutes in the one, two, and three-goal conditions, respectively). Thus, increasing the number of goals did not increase demands on the same total time (i.e., regardless of goal number, all participants had the same ratio of 2 minutes per task).

Goal setting

Consistent with experiment 6, a two-way ANOVA revealed a significant main effect of time budgeting on total goals set, qualified by the expected interaction (see tables below). When participants had multiple goals, budgeting time first decreased optimism bias in goal setting (two goals: p = .066; three goals: p = .003), but when participants had just a single goal, there was no such effect ($F < 1$).

Final goals (adjusted for outliers)

2 (Time budget) x 3 (number of goals) between-subjects ANOVA

EFFECT	TEST
Goals	$F(2, 573) = 80.29$, $p < .001$, $\eta^2 = .22$
Time budget	$F(1, 573) = 8.36$, $p = .004$, $\eta^2 = .01$
Time budget × goals	$F(2, 573) = 4.37$, $p = .013$, $\eta^2 = .01$
Time budget within 1 goal	$F(1, 573) = .55$, $p = .459$
Time budget within 2 goals	$F(1, 573) = 7.76$, $p = .006$, $\eta^2 = .01$
Time budget within 3 goals	$F(1, 573) = 8.78$, $p = .003$, $\eta^2 = .02$

TASK	GOALS	CONTROL	TIME-FIRST	Total
Transcription	1 GOAL	M = 23.14, SD = 13.96	M = 25.82, SD = 17.66	M = 24.44, SD = 15.88
	2 GOALS	M = 25.47, SD = 16.91	M = 19.11, SD = 11.13	M = 22.36, SD = 14.68
	3 GOALS	M = 21.19, SD = 11.93	M = 17.10, SD = 11.18	M = 18.88, SD = 11.66
Spelling	2 GOALS	M = 24.89, SD = 15.05	M = 21.30, SD = 12.32	M = 23.13, SD = 13.86
	3 GOALS	M = 22.20, SD = 12.88	M = 18.37, SD = 12.34	M = 20.04, SD = 12.69
Math	3 GOALS	M = 18.43, SD = 11.97	M = 15.56, SD = 10.06	M = 16.81, SD = 11.00
Total	1 GOAL	M = 23.14, SD = 13.96	M = 25.82, SD = 17.66	M = 24.44, SD = 15.88
	2 GOALS	M = 50.36, SD = 30.62	M = 40.42, SD = 18.25	M = 45.49, SD = 25.75
	3 GOALS	M = 61.83, SD = 33.69	M = 51.03, SD = 29.38	M = 55.72, SD = 31.69
	Total	M = 44.18, SD = 31.48	M = 39.70, SD = 24.97	M = 41.88, SD = 28.39

Outlier adjustment

Twenty-four goals (2.07% of the total 1,157) exceeded the limit (of 65) and were recoded as 65.