

How Being Busy Can Increase Motivation and Reduce Task Completion Time

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This research tests the hypothesis that being busy increases motivation and reduces the time it takes to complete tasks for which people miss a deadline. This effect occurs because busy people tend to perceive that they are using their time effectively, which mitigates the sense of failure people have when they miss a task deadline. Studies 1 and 2 show that when people are busy, they are more motivated to complete a task after missing a deadline than those who are not busy, and that the perception that one is using time effectively mediates this effect. Studies 3 and 4 show that this process makes busy people more likely to complete real tasks than people who are not busy. Study 5 uses data from over half a million tasks submitted by thousands of users of a task management software application to show that busy people take less time to complete a task after they miss a deadline for completing it. The findings delineate the conditions under which being busy can mitigate the negative effects of missing a deadline and reduce the time it takes to complete tasks.

Keywords: productivity, motivation, busyness, time management

Modern society places an incredible value on being productive (Rifkin, 1987). By successfully completing the tasks they set to accomplish, people are able to demonstrate their competence to themselves and others (Elliot & Church, 1997; Nicholls, 1984). In this regard, reducing the time it takes to complete tasks is a key factor to increase productivity. Productive people use their time in an effective manner so they are able to complete more tasks than those who are less productive (Keinan & Kivetz, 2011). As the number of tasks increases, however, people become busier, which may have negative consequences for productivity.

Busyness is a subjective state that results from individuals' assessment of how engaged they are in activities (Gershuny, 2005). This engagement is determined by the number of tasks they have to perform and the amount of time they spend on these tasks (Gershuny, 2005; Schor, 1992). Thus, busy people are engaged in more tasks than people who are not busy. When people are engaged in several tasks, it is difficult for them to complete a focal

task as other tasks compete for their limited time and attention (Dalton & Spiller, 2012), which can undermine task commitment and motivation (Shah & Kruglanski, 2008). Thus, busy people often take longer to complete tasks compared to people who are not busy (Boice, 1989; Seki, 2008; Schraw, Wadkins, & Olafson, 2007).

We contend that being busy may not always have a detrimental effect on the amount of time it takes to complete a task. In situations in which people miss a task deadline, they may become demotivated to complete the task. This occurs because missing a deadline represents the violation of a task standard, which has a negative impact on motivation (Cochran & Tesser, 1996). When people are busy, however, they are more engaged in activities, which may lead them to feel that they are using their time effectively. This perception of using time effectively may mitigate the negative impact of missing a deadline on motivation and the time it takes to complete a task. In summary, this research proposes that when people are not busy at the time they miss a deadline, they will be less motivated to complete the task. However, when people are busy at the time they miss a deadline, they feel that they are using their time effectively, and remain motivated to complete the task. Consequently, people who are busy take less time to complete the task with a missed deadline compared to those who are not busy.

Missed Deadlines Decrease Motivation to Complete a Task

When people engage in a focal task, they often self-impose a deadline for completing it (Ariely & Wertenbroch, 2002; Colby & Chapman, 2013). Setting deadlines helps people manage their time effectively by reducing the time it takes to complete a task

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(O'Donoghue & Rabin, 1999; Shu & Gneezy, 2010; Soman & Cheema, 2004). In fact, simply predicting that a task will be completed sooner can reduce the time it takes to finish the task (Buehler, Peetz, & Griffin, 2010). Thus, task deadlines serve as standards for determining whether people are managing their time effectively.

Just as completing a task on time is associated with effective time management, missing a deadline signals that one has failed to manage time effectively. This failure should have negative consequences for an individual's subsequent motivation to complete a task. This should occur because an individual's motivation is partially based on beliefs about their ability to achieve a desired outcome (Bandura, 1977). When people feel that they are unable to achieve a goal, their motivation to pursue the goal is reduced (Bandura & Simon, 1977). When people fail at goal pursuit or violate a standard in some way, it can lead to goal disengagement to overcome the negative feelings that result from failure (Cochran & Tesser, 1996; Soman & Cheema, 2004; Vohs, Park, & Schmeichel, 2013). Thus, after an initial violation, people are more likely to take part in behaviors that undermine the goal (Cochran & Tesser, 1996; Curry, Marlatt, & Gordon, 1987; Hill, 2004; Marlatt & Gordon, 1980; Scott, Nowlis, Mandel, & Morales, 2008). A common example is dieters' tendency to consume more calories (i.e., disengage from their dieting goal) after consuming a fattening preload (e.g., a milkshake; Polivy, Heatherton, & Herman, 1988).

While missing a task deadline does not imply that one cannot accomplish the task at some point in the future, missing a deadline is a violation of a preestablished standard for when the task should be completed. As such, missing a deadline can be perceived as a failure to manage time effectively, and have a detrimental effect on an individual's motivation to complete a task. Thus, the findings showing that setting deadlines reduces the time it takes to complete a task may not hold when people take longer than initially expected to complete the task (i.e., they miss the deadline), which is a common occurrence (Buehler, Griffin, & Ross, 1994; Byram, 1997; Kruger & Evans, 2004). Consistent with this notion, research has shown that people take longer to complete a task when they miss a deadline compared to those who did not set a deadline at all (Soman & Cheema, 2004). However, this research did not account for how busy participants were when they missed the deadline. Next, we offer a perspective on how being busy can mitigate the negative effect of missing a deadline.

Busyness and Task Completion

Exhibiting a strong work ethic has long been considered a virtue (Furnham, 1982; Merrens & Garrett, 1975; Weber, 1930). The view of work as a moral obligation is so deeply ingrained that when people retire they often feel the need to justify their leisure time by staying busy (Ekerdt, 1986). People display their busyness as a badge of honor (Gershuny, 2005), and to signal their social standing to others (Bellezza, Keinan, & Paharia, 2015). People who are highly educated and in high-status jobs have steadily increased the amount of hours they spend working (Jacobs & Gerson, 2004; Robinson & Godbey, 2005). Consequently, since the latter part of the 20th century, there has been a gradual increase in self-reported busyness (Robinson & Godbey, 2010; Schulte, 2014).

This view of work as a virtue may be behind the high value people attribute to constantly being engaged in activities. People often prefer action to inaction (Bar-Eli, Azar, Ritov, Keidar-Levin, & Schein, 2007), and feel better after engaging in tasks requiring activity (e.g., walking) compared to tasks involving inactivity (e.g., waiting) (Hsee, Yang, & Wang, 2010). People place great value on things that require effort (Aronson & Mills, 1959; Festinger, 1962; Norton, Mochon, & Ariely, 2012) and, while they rate their job as one of their least pleasurable activities, they also rate it as one of the most rewarding (White & Dolan, 2009). Moreover, people feel more productive when they are executing tasks compared to planning tasks (Gino & Staats, 2015). As a consequence, when given the opportunity to practice a task (i.e., execute) versus reflect on how they will perform the task (i.e., plan), a large majority choose practice over reflection, even though reflection leads to greater task performance (Di Stefano, Gino, Pisano, & Staats, 2015).

The greater value assigned to activity (vs. inactivity) has implications for people's perceptions of how effectively they are using their time. When people are engaged in worthwhile activities (i.e., are busy), they should perceive that they are using their time more effectively compared to when they are inactive (i.e., are not busy). This perception is fundamental to understanding how being busy can increase motivation and reduce the time it takes to complete a task after missing a deadline for the task.

When people miss a deadline, they violate a standard established for the task. The extent to which a standard violation lowers motivation depends on the perception of failure that results from the transgression (Cochran & Tesser, 1996; Wilcox, Block, & Eisenstein, 2011). For instance, the number of calories in a fattening preload is often not enough to exceed a dieter's preestablished limit of calories for the day. Nevertheless, people who consume a fattening preload disengage from their dieting goal and overconsume because they feel that they have failed to adhere to their diet. Alternatively, in the presence of factors that reduce the sense of failure, people may remain engaged in pursuing the goal. For example, when people set a goal to avoid making errors in a task, the sense of failure from making an error is smaller when people set distant goals (20 errors over 10 trials) compared to proximal goals (2 errors per trial). Consequently, people are more motivated to perform well when they set distant compared to proximal goals (Cochran & Tesser, 1996). These findings suggest that motivation after a goal standard violation may remain high when factors diminish the sense of failure from violating the goal.

We propose that motivation to complete a task after a standard violation need not be determined by goals specific to the current task. When people miss a deadline for completing a task, they may remain motivated to complete the task even if the missed deadline clearly represents the violation of a preestablished standard. Contrary to the research discussed above, we propose that this motivation may come from being engaged in the pursuit of other goals, not related to the task for which a deadline has been missed. Busier people perceive that they are doing well with regards to a different goal—using their time effectively. The perception that one is using their time effectively should reduce the sense of failure, especially when it comes from missing a deadline, and lead them to remain motivated to complete the task. Therefore, people who miss a deadline should complete the task in less time when they are busy compared to when they are not busy.

Our theory differs from previous research on busyness, goal violations, and motivation to pursue a goal in important ways. First, it shows that busyness does not always lead people to take longer to complete a task. Being busy at the time of missing a deadline can mitigate the sense of failure from missing the deadline and reduce the time it takes to complete a task. Second, it demonstrates that situational attributions (e.g., they were responsible vs. I was responsible) are not always the driver of motivation following a goal-standard violation. In situations involving time management, such as when a deadline is missed, motivation is also determined by the perception that one is managing time effectively, which is not a situational attribution. Third, it shows that goals that are not related to the violated goal (i.e., an array of other tasks that are being pursued at the time the deadline is missed) can influence motivation. To our knowledge, this perspective has not been explored in previous research on goal violations.

Overview of Studies

In summary, we predict that when people miss a deadline for completing a task, those who are busy at the time that they miss the deadline will be more motivated to complete the task and take less time to complete it compared to those who are not busy. We tested this prediction and its driving mechanism in five studies. In Study 1, participants manipulated to feel busy were more motivated to complete a task with a missed deadline compared to those who were not manipulated, an effect mediated by the perception that time was being used effectively. In Study 2, we replicated these findings while also ruling out the possibility that busyness served as a situational attribution that mitigated the sense of failure from missing a deadline. In Study 3, we demonstrated that after missing a deadline, the maintenance of task motivation resulting from being busy increases the likelihood of completing the task in the near future, as per self-reports provided by research participants. In Study 4, we replicated these findings in a context where missing a deadline and the timing of task completion is directly observed. Finally, in Study 5 we analyzed data from 586,808 tasks submitted by 28,806 users of a task management software application that is designed to help people manage their tasks. We found that once people miss an initial task deadline, busy people complete tasks sooner than those who are not busy.

Study 1

The objective of the first study was to demonstrate that missing a task deadline reduces motivation to complete the task, but that this effect is mitigated when people are busy at the time of missing the deadline. We manipulated the extent to which participants perceived that they were busy prior to having them indicate their motivation to complete a task with or without a missed deadline. We expected participants who perceived that they were busy to display greater motivation to complete the task with a missed deadline compared to those who did not perceive that they were busy. We also expected participants who did not perceive that they were busy to display reduced motivation to complete the task with a missed deadline compared to one without a missed deadline. Additionally, we expected the effect of busyness on motivation for the missed deadline task to be mediated by the perception that time is being used effectively.

Method

Pretest. We conducted a pretest to assess whether our busyness manipulation would be successful at making participants perceive that they are using their time effectively. Sixty-one participants from Amazon Mechanical Turk (Mturk) participated in the pretest for a small monetary payment. In this first study, we manipulated a general perception of busyness, without associating this busyness with specific tasks. This allowed us to examine the impact of busyness on the perception of effective time management, while eliminating the possibility that participants were using the presence of other tasks as a situational attribution for missing the task deadline. Participants were first asked to think about all of the tasks they had to do recently and to indicate how busy they were on a two-item scale. To manipulate perceived busyness, participants responded to these items on biased scales using a method for manipulating subjective self-perceptions adopted from previous research (Clarkson, Janiszewski, & Cinelli, 2013; Tormala & DeSensi, 2008). In the not-busy condition, the scale measuring “How busy have you been?” was shifted so that the highest value corresponded to moderately busy (1 = *not busy at all* and 7 = *somewhat busy*). Similarly, the scale measuring “How many tasks do you have to accomplish?” was altered so that the highest value corresponded to having a moderate amount of things to do (1 = *very few tasks* and 7 = *some tasks*). In the busy condition, the scales were shifted so that the lowest value of each scale corresponded to moderately busy (1 = *somewhat busy* and 7 = *extremely busy*) and having a moderate amount of tasks to do (1 = *some tasks* and 7 = *very many tasks*). We then measured effective time usage using a two-item measure: “To what extent do you feel that you are using time effectively?” (1 = *not at all* and 7 = *very much*), “To what extent do you feel that you are using time efficiently?” (1 = *not at all* and 7 = *very much*), $r = .86$. An analysis of variance (ANOVA) revealed that participants felt they were using their time more effectively in the busy condition ($M = 5.38$; $SE = .24$) compared to the not-busy condition ($M = 4.23$; $SE = .28$), $F(1, 59) = 9.43$, $p < .01$. Thus, the results indicate that the perception of being busy, as instantiated by our busyness manipulation, does affect people’s perception that they are using their time effectively.

Participants. Two hundred fifty-eight participants from MTurk participated in the main study for a small monetary payment. Fifty-seven participants indicated that they did not have a task such as the one they were asked to describe and were excluded from the analysis, resulting in a final sample of 201 participants (46% female; $M_{\text{Age}} = 34$; $SD = 11$).

Procedure. This study used a 2 (busyness: busy vs. not busy) by 2 (task: missed deadline, no missed deadline) between-subjects design. Participants were instructed that the purpose of the study was to understand the different tasks that people perform on a daily basis. Participants in the missed deadline condition were instructed to think about a task that they had wanted to get accomplished last week, but did not get a chance to finish and intended to accomplish this week. They indicated whether there was such a task (yes/no). In all conditions, participants who indicated that they did not have a task that matched the description were not asked any remaining questions in the survey. The procedure for the no missed deadline condition was similar to the missed deadline condition. However, participants answered questions about a task they had not wanted

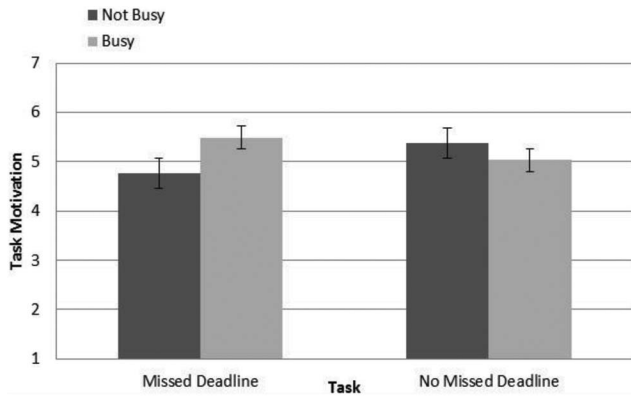


Figure 1. Effects of busyness and task on motivation (Study 1).

to get accomplished last week and intended to accomplish this week.

We then administered the same busyness manipulation described in the pretest, except that we asked how busy participants were last week, instead of recently. We did this because we wanted to assess the effect of perceived busyness at the time of missing the deadline on motivation. Participants then responded to the same measure of effective time usage as in the pretest, $r = .95$. Afterward, participants were asked to describe the task. We asked them to describe this task after the busyness manipulation to avoid the possibility that describing the task would impact their perception of how effectively they were using their time. They then indicated their current motivation to complete the task this week on a three-item 7-point motivation scale: “How likely are you to procrastinate on this task?” (1 = *not likely* and 7 = *very likely*), “How interested are you in finishing this task?” (1 = *not interested* and 7 = *very interested*) and “How motivated are you to finish this task?” (1 = *not motivated* and 7 = *very motivated*), $\alpha = .70$. As a manipulation check for the missed deadline manipulation, participants indicated the extent to which the task they wrote about earlier in the session was one where they missed the deadline on (1 = *not at all* and 7 = *very much*) before completing several demographic questions.

Results and Discussion

Manipulation check. A test of the missed deadline manipulation demonstrated a main effect of deadline, $F(1, 197) = 7.52$, $p < .01$. Participants were more likely to write about a task with a missed deadline in the missed deadline condition ($M = 4.13$; $SE = .21$) compared to the no missed deadline condition ($M = 3.32$; $SE = .21$). The effects of busyness and the task by busyness interaction were insignificant ($F_s < 1$).

Effective time usage. An ANOVA revealed that the effect of busyness was significant, $F(1, 197) = 10.40$, $p < .01$. Participants in the busy condition indicated that they were using their time more effectively ($M = 4.73$; $SE = .17$) compared to the not-busy condition ($M = 3.98$; $SE = .16$). The effects of task, $F(1, 197) = .01$, $p = .97$, and the task by busyness interaction, $F(1, 197) = 1.81$, $p = .18$, were insignificant.

Task motivation. As depicted in Figure 1, there was a task by busyness interaction, $F(1, 197) = 7.99$, $p < .01$. As predicted,

participants in the not-busy condition were less motivated to complete the task in the missed deadline condition ($M = 4.76$; $SE = .20$) compared to the no missed deadline condition ($M = 5.37$; $SE = .18$), $F(1, 197) = 5.05$, $p = .03$. Participants in the busy condition were marginally more motivated to complete the task in the missed deadline condition ($M = 5.49$; $SE = .20$) than in the no missed deadline condition ($M = 5.03$; $SE = .18$), $F(1, 197) = 3.04$, $p = .08$. The directional reversal of the effect may be due to participants being more motivated to complete tasks they are late on when they do not perceive missing a deadline as a failure. As predicted, participants were more motivated to complete the task with a missed deadline in the busy condition compared to the not-busy condition, $F(1, 197) = 7.34$, $p < .01$. There was no significant difference in motivation to complete a task without a missed deadline between the busy and not-busy conditions, $F(1, 197) = 1.64$, $p = .20$.

We tested whether perceptions of effective time usage mediated the effect of busyness on motivation in the missed deadline versus no missed deadline condition using moderated mediation. Thus, we controlled for the effects of time usage effectiveness and the interaction between time usage effectiveness and task on motivation. After applying these controls, the effect of busyness on task motivation became nonsignificant in the missed deadline condition, $B = .45$, $t(195) = 1.64$, $p > .10$, which was expected given the proposed role of perceptions of effective time usage. Similarly, the effect was nonsignificant in the no missed deadline condition, $B = -.42$, $t(195) = -1.65$, $p > .10$. We then analyzed the indirect effects using conditional process modeling (5,000 samples; Hayes, 2013). In the missed deadline condition, the indirect effect of busyness on motivation was significant with a confidence interval that did not include zero, indirect effect = .28, 95% CI (.11, .56), supporting mediation. In the no missed deadline condition, the indirect effect of busyness on motivation was not significant with a confidence interval that included zero, indirect effect = .09, 95% CI (-.01, .31), which does not support mediation.

These findings provide support for our theory. When people miss a deadline for completing a task, they are more motivated to complete the task when they perceived they were busy at the time they missed the deadline. This effect is mediated by the perception that time is being used effectively when people are busy. In the next study, we examine the process underlying these findings in more detail while ruling out an alternative explanation.

Study 2

Individuals miss deadlines for a variety of reasons. Some are personal, such as procrastination or simply forgetting about the deadline. Others are situational, such as an unexpected event that forces people to delay the completion of a task. From a time availability standpoint, one would expect busier people to miss more deadlines due to situational factors. Busy people have less free time so they are less capable of accommodating unexpected events that arise in their daily lives. When people attribute the cause of a transgression to situational factors, it reduces the sense of failure and they remain motivated to complete the task (Perry & Magnusson, 1989). This suggests that situational attributions may play a role in the maintenance of motivation for busy people in the presence of failure. However, our theory proposes that the perception that one is using time effectively is also a driver of our

findings. Therefore, our objective was to provide additional evidence for the mechanism we propose while demonstrating under which circumstances situational attributions may play a role. To accomplish this, we examined how busyness and the presence of an unexpected event influence motivation when people miss a task deadline, while also exploring the role of effective time usage and situational attribution as mediators of this relationship.

To examine situational attributions, we measured four dimensions of causal attributions for missing a deadline (McAuley, Duncan, & Russell, 1992): locus of causality, personal control, stability, and external control. Locus of causality refers to the extent to which people attribute a cause to internal factors (vs. external factors). Personal control refers to the extent to which people attribute a cause to something that they can control (vs. cannot control). Stability refers to the extent to which people attribute a cause to stable factors (vs. unstable factors). External control refers to the extent to which the cause is something under other people's control (vs. not under other people's control). Of these dimensions, we expected locus of causality and personal control to be potential mediators between busyness and task motivation if situational attribution plays a role in the process. We had this expectation as the two dimensions capture the extent to which people attribute a cause of failure to situational factors that are outside of their control (i.e., unexpected events).

Method

Participants. Two hundred two participants from Mturk participated in the study for a small payment. Twenty-four participants indicated that they did not have a task such as the one they were asked to describe and were excluded from the analysis, resulting in a final sample of 178 participants (48% female; $M_{\text{Age}} = 35$; $SD = 12$).

Procedure. Participants were instructed that the purpose of the study was to understand the different tasks that people perform on a daily basis. All participants described a task for which they had missed a deadline. Whereas the previous study was conducted at the beginning of the week, this study was conducted on a Friday. Thus, participants were instructed to think about a task that they had wanted to get accomplished this week but did not get a chance to finish, and intended to accomplish next week. Participants indicated whether there was such a task (yes/no). Participants who indicated that they did not have a task that matched the description were not asked any remaining questions in the survey.

All participants were then asked to describe the task and to indicate their task motivation on a five-item motivation scale: "How likely are you to procrastinate on this task?" (1 = *not likely* and 7 = *very likely*), "How interested are you in finishing this task?" (1 = *not interested* and 7 = *very interested*), "How motivated are you to finish this task?" (1 = *not motivated* and 7 = *very motivated*), "How important is the task to you?" (1 = *not important* and 7 = *very important*), and "How valuable is the task to you?" (1 = *not valuable* and 7 = *very valuable*), $\alpha = .82$. Afterward participants were administered two scales that were presented in random order. One was the same two-item effective time usage measure from Study 1, $r = .88$. Another one was a 7-point version of the Revised Causal Dimension Scale (McAuley et al., 1992), which measures four dimensions of causal attribution:

Locus of causality, personal control, stability, and external control, all $\alpha s > .70$.

Participants then completed a two-item measure asking them to indicate how difficult (1 = *not difficult at all* and 7 = *very difficult*) and hard (1 = *not hard at all* and 7 = *very hard*) it was for them to complete the task when they had intended to, $r = .77$. We included this measure to examine whether busyness was positively correlated with how difficult participants felt it was to meet the deadline on their focal task. While this was the case, $r = .28$, $p < .001$, busy people were still able to manage their time effectively (see analysis below). We then measured how busy participants felt they were during the week using a two-item scale, "How busy were you this week?" (1 = *not busy at all* and 7 = *very busy*) and "How many things did you have to do this week?" (1 = *very few things* and 7 = *a lot of things*), $r = .86$. After completing these questions, participants were asked to indicate whether something unexpected or unusual happened that prevented them from getting the task done this week (yes/no).

Results and Discussion

Eighty-two participants (46%) indicated that they missed a deadline due to an unexpected event. Busyness was positively correlated with the presence of an unexpected event, $r = .24$, indicating that busier people were more likely to miss a deadline due to an unexpected event than people who were less busy. We regressed task motivation on busyness, unexpected event, and their interaction. The effects of unexpected event, $B = 2.33$, $t(174) = 3.52$, $p < .001$, and busyness on task motivation were significant, $B = .33$, $t(174) = 4.54$, $p < .001$. Thus, both unexpected events (i.e., situational causes) and busyness increased task motivation after missing a deadline.

The interaction between busyness and unexpected event was also significant, $B = -.35$, $t(174) = -3.02$, $p < .01$. Busyness had a significant effect on motivation when there was no unexpected event, $B = .33$, $t(174) = 4.54$, $p < .001$, but not when there was an unexpected event, $B = -.03$, $t(174) = -.28$, $p = .78$. This finding indicates that unexpected events are not the only reason why busier people are more motivated to complete a task after missing a deadline. Although busier people are more likely to miss a deadline because of an unexpected event, the effect of busyness on motivation primarily emerges in the absence of an unexpected event. We also examined the effect of an unexpected event at different levels of busyness (i.e., plus vs. minus one standard deviation from the mean). As demonstrated in Figure 2, an unexpected event did not have a significant effect on task motivation when people were busy, $B = -.13$, $t(174) = -.48$, $p = .62$, but did have a significant effect when people were not busy, $B = 1.05$, $t(174) = 3.71$, $p < .001$.

We examined whether effective time usage, and personal/locus of control mediated the relationship between busyness and task motivation. Because personal control and locus of control were highly correlated, $r = .65$, we combined the measures to create a situational attribution index, such that higher numbers corresponded to participants attributing the cause to situational factors that were outside of their control. We jointly tested whether effective time usage and situational attribution mediated the effect of busyness on task motivation. Busyness had a significant effect on effective time usage, $B = .44$, $t(176) = 6.67$, $p < .001$, and

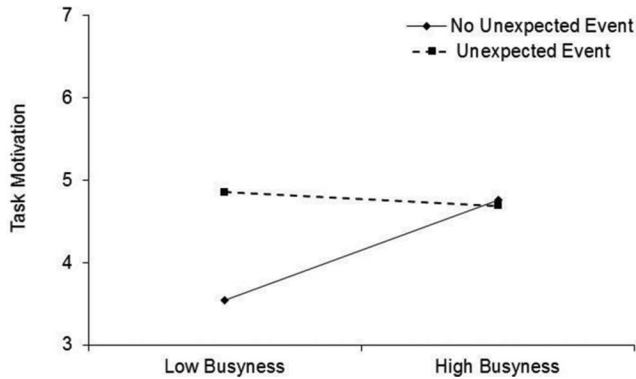


Figure 2. Effect of busyness and unexpected event on motivation (Study 2).

situational attribution, $B = .26$, $t(176) = 3.50$, $p < .001$. Thus, busier people not only perceived that they were using time more efficiently, but also were more likely to attribute the cause of the missed deadline to a situational cause. After controlling for the effects of the potential mediators and their interactions, the effect of busyness on task motivation was not significant, $B = .10$, $t(171) = 1.55$, $p = .12$. We conducted indirect effect tests at each level of the event factor (5,000 samples; Hayes, 2013) to examine whether one or both of the potential mediators were responsible for the reduction in significance of the effect of busyness on task motivation. When there was no unexpected event, the indirect effect of busyness on motivation through effective time usage was significant with a confidence interval that did not include zero, indirect effect = .11, 95% CI (.03, .21), while the indirect effect through situational attribution was insignificant, indirect effect = .02, 95% CI (-.01, .07). When there was an unexpected event, the indirect effect of busyness on motivation through effective time usage was insignificant with a confidence interval that included zero, indirect effect = .03, 95% CI (-.05, .16), as was the indirect effect through situational attribution, indirect effect = .01, 95% CI (-.01, .09). Thus, the findings indicate that effective time usage mediates the effect of busyness on task motivation in the absence of an unexpected event, but not when there is an unexpected event.

The results provide additional support for our theory that busyness at the time of missing a deadline increases motivation as a function of people's perception that they are using time effectively. The findings also indicate that busier people are more likely to miss deadlines because of situational causes (i.e., unexpected events), which can increase motivation. While this suggests that situational attributions may play some role in the process, consistent with our theory we find that the effect of busyness on task motivation is strongest in the absence of an unexpected event for missing a deadline (i.e., a situational cause). Additionally, the relationship between busyness and task motivation is mediated by the perception that one is using time effectively.

Study 3

The previous studies investigated our predictions by examining the impact of missing a deadline and busyness on motivation. In Study 3, we examine how being busy at the time of missing a deadline affects whether people will complete a task in the near

future. We used a two-part longitudinal study design in which participants reported on an actual task whose deadline they had missed in the preceding week. In part 1, participants described the task with a missed deadline and indicated their current motivation to complete it. In part 2, 1 week later, participants indicated whether or not they had actually completed the task during the previous week. We predicted that people who were busy at the time of missing the deadline would show greater motivation to complete the task and therefore be more likely to complete the task during the week compared to people who were not busy.

Notably, our theory does not suggest that being busy will always reduce the time of task completion. When people are busy after missing a deadline, being busy cannot be used retroactively to infer that one was using their time effectively when the deadline was missed. Thus, being busy after missing a deadline should not mitigate the sense of failure from missing the deadline. However, being busy after missing a deadline may lead people to delay task completion because being engaged in more activities makes it more difficult to complete focal tasks (Dalton & Spiller, 2012). While this was a reasonable expectation, we expected that being busy when (i.e., just before) a deadline was missed would increase likelihood of completion independently of any effect of being busy after missing the deadline.

Method

Participants. We set a target sample size of approximately 250 participants who would complete both parts of the study. Moreover, because data were to be collected at two separate times, we expected a high attrition rate between Parts 1 and 2. We also expected that some participants recruited for Part 1 would not have a task that they had intended to complete the week before but did not complete (i.e., a missed deadline task). Consequently, we sent Part 1 of the survey to approximately 1,000 participants on MTurk and received 845 complete responses to Part 1 of the survey. Several participants indicated that they did not have a task that they intended to complete the week before but did not complete, or left blank one or more of our key measures in Part 1 (e.g., measures of busyness or task motivation). Of the participants who completed Part 1, we received 303 completed responses for Part 2 one week later. We then excluded 56 of these participants because they failed a data-consistency check by providing inconsistent responses to one or more of the demographic questions asked in both parts of the study (e.g., some participants indicated they were female in Part 1 and male in Part 2 or reported different ages in Parts 1 and 2). Thus, our results are based on the 247 remaining participants who provided complete and valid data for both parts of the study.

We acknowledge that a general concern with participant attrition in longitudinal studies such as this is that the attrition introduces sampling bias. To check this, we compared the 247 participants used in our analysis demographically to the participants who did not provide complete and valid data in Part 2. There were no significant differences in distributions of age, sex, ethnicity, household income, or language, all $ps > .48$. Thus, we are confident that participant attrition did not bias the sample.

Procedure. Data were collected on two consecutive weekends. In Part 1, participants were asked to describe a task for which they had missed a deadline. The task was described as a task they

had wanted to complete during the week that just ended, did not finish, and intended to complete in the upcoming week. Before describing this task, participants were given the option to skip this portion of the study by indicating that they did not have a task that they had intended to complete.

All participants were then asked to describe the task and to indicate their task motivation on a four-item motivation scale: "How likely are you to procrastinate on this task?" (1 = *not likely* and 7 = *very likely*), "How interested are you in finishing this task?" (1 = *not interested* and 7 = *very interested*), "How motivated are you to finish this task?" (1 = *not motivated* and 7 = *very motivated*), and "How important is the task to you?" (1 = *not important* and 7 = *very important*), $\alpha = .76$. Participants then answered several filler questions about the task, including the positive and negative emotions they felt from missing the deadline, how much of the task they completed, and how many minutes they expected it would take for them to complete the task. An analysis showed that controlling for these variables did not change the findings of our subsequent analyses. Next, participants were told to copy and paste their task description into a document so that it could be saved to their computer. How busy participants felt at the time of missing the deadline (i.e., during the previous week) was measured on the same two-item scale as Study 2, $r = .81$. After answering questions about the missed deadline task, participants were asked the same questions about a task that they had not intended to complete in the preceding week, but did intend to complete in the upcoming week. Thus, the second task was one with the same completion time goal as the focal task, but for which no deadline had been missed. After describing the second task, participants were instructed to save the descriptions of both tasks on their computer so that they could participate in a follow-up study a week later (Part 2).

On the next weekend, participants were invited by e-mail to complete Part 2 of the study. They were first asked to paste the focal task description that they wrote and saved 1 week earlier into an essay box in the survey. Afterward, they indicated whether they had actually completed this task during the intervening week. They then indicated how busy they were the week after missing the deadline on the same two items used in part 1 ($r = .81$). This procedure was then repeated for the other task that they described in Part 1 for which they had not missed the deadline.

Results and Discussion

We expected that busyness during the week of Part 1 (i.e., when they missed the deadline) would positively affect the probability of actually completing the task with the missed deadline in the upcoming week (Part 2). We ran a logistic regression to see if our continuous measure of busyness at the time of missing the initial deadline positively affected the likelihood of completing the task in the following week. We also controlled for how busy participants were in the intervening week, after missing the deadline (measured in the Part 2 survey). We found that busyness at the time of missing the initial deadline (i.e., how busy people were during the week before the Part 1 survey) had a positive effect on motivation to complete the task (measured in Part 1), $B = .18$, $t(245) = 3.37$, $p < .001$. It also had a positive effect on the likelihood of completing the task, $B = .27$, $Z = 2.30$, $p = .02$. As expected, busyness during the intervening week had a significant

negative effect on the likelihood of completing the task, $B = -.24$, $Z = 2.10$, $p = .04$.

We tested whether task motivation mediated the likelihood of completing the task. When motivation to complete the task was added to the logistic regression, the effect of busyness at the time of missing the initial deadline was reduced in significance, $B = .24$, $Z = 1.85$, $p = .06$. We then examined whether being busy at the time of missing the initial deadline indirectly affected the likelihood of completing the task using logistic mediation analysis (5,000 samples; Hayes, 2013). The indirect effect of busyness at the time of missing the initial deadline on the likelihood of completing the task was positive with a confidence interval that did not include zero, indirect effect = .12, 95% CI (.04, .21). Thus, being busy at the time of missing a deadline makes it more likely that a person will later complete the focal missed deadline task because their motivation to complete that task is increased by being busy.

We also examined how busyness in the prior week affected motivation to complete the task they did not intend to complete in the week preceding Part 1 but did plan on completing in the upcoming week (i.e., the second task). How busy participants were did not significantly affect motivation to complete the no missed deadline task, $p = .19$. Further, busyness measured in Part 1 did not significantly affect likelihood of actually completing the task, $p = .15$.

Finally, we conducted an analysis in which we combined the data for the two tasks and estimated a single logistic regression model that allowed for the effect of busyness measured in Part 1 on the likelihood of task completion to be moderated by the type of task (i.e., missed deadline or not) as a within-subject factor. We expected to find the effect of busyness measured in Part 1 on task completion to be significant only for the missed deadline task, which was the case, $B = .27$, $t(472) = 2.30$, $p = .02$. For the no missed deadline task, the simple effect was not significant, $B = .17$, $t(472) = 1.43$, $p = .16$. We caution that strong inferences cannot be made from this analysis because the order of asking about these tasks was neither randomized nor counterbalanced. We adopted this procedure because we were primarily interested in the focal missed deadline task and therefore always asked about it first. In any case, the results of this robustness analysis are consistent with the above reported findings and thus provide additional support for our theory.

This longitudinal study shows that busy people are not only more motivated to complete a task when they miss a deadline for completing it, as indicated by the intention measures in prior studies, but are actually more likely to complete the task in the near future. The next study examines the influence of missing a deadline and busyness on task completion using a procedure that allowed us to actually observe when a deadline is missed and when the task was completed.

Study 4

A limitation of the previous study is that it relied on self-reports related to whether the task was completed or not. Thus, it is possible that participants inaccurately reported on whether or not they completed the task during the week between the two parts of the study. In Study 4 we observe real behavior and demonstrate that when people miss a deadline, busier people complete tasks in less time.

Method

Participants. One hundred thirty-nine undergraduates from a large northeastern university were recruited for the study for a small payment. Fifty participants did not complete the focal task, resulting in a final sample of 89 participants (54% female; $M_{Age} = 22$; $SD = 4$).

Procedure. The study was conducted over four sessions in a 3-week period. Three of the sessions were conducted on a Wednesday and one session was conducted on a Thursday. Controlling for the session and day of the week does not change the findings so these factors are not included in our final analysis. Participants were initially recruited to participate in a series of unrelated studies that were administered in a behavioral lab. After their participation in the study, they were informed that researchers were conducting an optional study on reading comprehension that would require them to read an excerpt from an academic journal article before answering questions about the article. Their answers would be submitted using an online survey and the survey link would be active beginning at midnight the day that they participated in the unrelated studies. They were instructed that they would be paid \$5 for completing the study and that it was estimated that reading the article and answering the questions would take about 20 min. Additionally, participants were instructed that they had up until midnight 7 days after agreeing to participate in the study to submit their answers. However, they would receive a \$1 bonus for completing the task by midnight 2 days later. After receiving these instructions, participants were asked to indicate when they intended to complete the survey purportedly for planning purposes. Their options were by midnight 2 days later or by midnight 7 days later. All participants except one indicated that they intended to complete the survey by midnight 2 days later. Thus, with the exception of one person, everyone set a deadline of 2 days later to complete the survey. Of the 89 people who completed the survey, 24 missed their deadline. The one person who indicated they would complete the survey by the later deadline completed the survey before the 2-day deadline.

Our dependent variable was the time it took to complete the survey after missing the deadline, which was measured by the day in which the survey was submitted after the 2-day deadline. As an example, someone who submitted the survey at any point on Saturday when the 2-day submission deadline was Friday midnight was recorded as a 1. The survey that participants completed asked them some basic questions about the article to ensure that they had read the article before measuring our independent variable. Our independent variable was busyness, which was measured in one of two ways. Because busyness involves spending more time on different activities (Gershuny, 2005), we created a measure that captured how much time people were engaged in other activities (time busyness). Specifically, participants indicated how many hours they spent on each day, up until the day that they submitted the study, doing three types of tasks: a) being in class, b) studying or c) engaging in other commitments (e.g., work, meetings). We created a measure of time busyness before the deadline by averaging the time spent per day on these other tasks for the 2 days before the deadline. We created a measure of time busyness after the deadline by averaging the time spent on these other tasks per day between the 2-day deadline and the day the task was actually completed. In addition, we measured participants subjective per-

ception of how busy they were (subjective busyness) prior to the 2-day deadline, using the same two-item scale as prior studies, $r = .89$. We also measured subjective busyness after the deadline using the same two items as in prior studies, $r = .76$.

Results and Discussion

Before analyzing the time it took to complete the survey, we examined whether there were demographic differences between those who completed the survey before the deadline and those who completed the survey after the deadline. Participants who missed the deadline were slightly but significantly older ($M = 21.67$) than those who did not miss the deadline ($M = 20.17$), $F(1, 87) = 2.04$, $p = .02$. Participants who missed the deadline were also more likely to be male ($M = 46\%$) than those who did not miss the deadline (23%), $\chi^2(1) = 4.23$, $p = .04$. However, controlling for age or gender did not change our findings so we did not control for them in the subsequent analyses.

We assessed the effect of time busyness by regressing time to completion on time busyness before the deadline and time busyness after the deadline. As expected, time busyness before the deadline had a negative effect on time to completion, $B = -.47$, $t(21) = -3.63$, $p < .01$. This means that participants who were busier (vs. less busy) at the time that they missed the deadline took less time to complete the task. A similar analysis using the subjective busyness measure found consistent results, as subjective busyness before the deadline had a negative effect on time to completion, $B = -.51$, $t(21) = -3.05$, $p < .01$. The effect of time busyness after the deadline was significant, $B = .28$, $t(21) = 3.19$, $p < .01$, while the effect of subjective busyness was not, $B = .10$, $t(21) = .63$, $p = .54$. Consistent with the results of Study 3, the significant result on the time measure after the deadline indicates that being busy after missing a deadline is not part of the hypothesized process, as the effect of being busy at the time of missing the deadline was still significant.

The results of Study 4 support our theory using both time-related and subjective measures of busyness, and observing real behavior. People who were busier when missing a deadline took less time to complete the task compared to those who were less busy. Thus, while being busy can lead to longer task completion times, this is not the case when a deadline is missed. Being busy can in fact decrease task completion time as a function of the effect it has on perceptions of managing one's time effectively.

Study 5

Study 5 is an attempt to find additional support for the effect of busyness on the time it takes to complete tasks. We used a dataset featuring tasks created and completed over a 538-day period in 2010 and 2011 by users of a popular task management software application. People use this application to help keep themselves organized in their personal and professional lives. The application is used on mobile devices such as smartphones and tablets, by visiting a website, or through integration with e-mail and calendar software. People use this application for a variety of reasons, thus the data covers a wide variation of tasks, both personal and professional (e.g., buy groceries, pay bills, make doctor appointment, finalize project report). When users create a task in this application, they can set a date as a "deadline" for completing the

task (this can also be later changed as many times as desired). Users also can mark a task as “complete” once they have finished it.

Similar to Studies 3 and 4, we examined how the extent to which a user is busy influences the time it takes to complete a task after missing a deadline. However, in those studies we only considered whether a task with a missed deadline was completed within approximately 1 week (Study 3) or over a few days (Study 4) as a function of how busy people were at the time of missing the initial deadline. In this study, we were able to examine how busyness influenced the time it took to complete a task over a longer period of time.

Data

Our dataset includes 586,808 tasks from 28,806 separate application users over a 538-day data-collection window. All tasks in our analysis were marked by users as “complete” at some point during this period, and were tasks for which users set deadlines (which ranged between 1 and 365 days from the date of task creation; $M = 8.89$ days, $SD = 23.48$). We also had access to tasks that were never marked as “complete” during this period, but excluded these because we were specifically interested in the time it took to complete a task. The dependent variable was time to completion for a task, measured as the number of days from when a user created a task to when they marked it as “complete” in the application. Our analysis focused on how two key variables, which represented missed deadlines and busyness, affected this outcome.

For missed deadlines, the nature of this dataset was such that we could not precisely know when a deadline was missed. Although users set initial deadlines for completing tasks and can alter these deadlines as often as they like, the true deadline a user has in mind for a task may not be reported. It is also possible that a task’s due date changes so a user revises it even though they have not (yet) missed the deadline for completing the task. To overcome these challenges, inherent to using a large dataset, we measured the number of times a user changed an initial task deadline and used this as an indicator of the underlying probability that a given task is a “missed deadline” task. Our logic is that the more times a deadline is changed, the more likely it is that the user failed to complete the task by the deadline that they had in mind for that task.

For busyness, we used the number of other incomplete tasks a user had as an indicator of how busy they were at a given point in time, based on the logic that more incomplete tasks indicates that a person has more activities to do and thus should be busier than a person with fewer incomplete tasks. A key consideration was the time at which this measure was taken. Based on our theory and the previous studies, an ideal measure of busyness would be a user’s number of incomplete tasks at the time of missing a deadline. However, as noted previously, the nature of our data makes it impossible to know exactly when a deadline was missed. Thus, it is difficult to pinpoint a day to take a measure of busyness if it were operationalized as the number of other incomplete tasks a user had at the time of missing a deadline. Instead, we considered two reasonable alternative operationalizations for busyness. First, we measured busyness as the number of other incomplete tasks a user had at the time they created the task. This is reasonable because the mean initial deadline was short (8.89 days after task creation), meaning that the time between creating a task and

changing a deadline (if at all) was also short. This makes it unlikely that users experienced dramatic fluctuations in their levels of busyness between the time they created a task and the time they might have missed a deadline. Second, we measured busyness as the number of other incomplete tasks a user had 1 day prior the first time they revised a task’s initial deadline if there was at least one deadline change. Or, if there were no deadline changes, we used the number of other incomplete tasks a user had when the task was created. Both measures were tested and produced consistent results, which was expected because these two operationalizations were highly correlated, $r = .94$, $p < .001$ (for brevity we report results only for the first operationalization). Also, if we dropped the tasks that had no deadline changes, the correlation between these measures still indicated high equivalence, $r = .94$, $p < .001$.

Additionally, our dataset included a number of control variables as they might have affected time to task completion, could have been correlated with the two explanatory variables, and/or allowed us to control for individual differences affecting productivity that are unrelated to our theory. The following variables were used: (a) *User completion time* measured as the average number of days a user took to complete tasks based on all tasks completed prior to the focal task was created (this controls for differences in users’ productivity tendencies); (b) *User completion rate* measured as the proportion of a user’s tasks created prior to the focal task that had been completed (this also controls for differences in users’ productivity tendencies); (c) *First task*, which equals 1 if the focal task was the user’s first task created or -1 otherwise (this controls for the possibility that a user’s first task was special or different from other tasks); (d) *First week of month*, which equals 1 if the task was created in the first week of a month or -1 otherwise (this controls for the possibility that tasks created at the beginning of a month may be treated differently to tasks created later in a month); (e) *Last week of month*, which equals 1 if the task was created in the last week of a month, or -1 otherwise (this controls for the possibility that tasks created at the end of a month may be treated differently to tasks created earlier in a month); (f) *Day of week task was created*, a set of indicators for the day of the week that the task was created (this controls for seasonality); and, finally, (g) *Month of year task was created*, a set of indicators for the month of the year that the task was created (this also controls for seasonality).

Results and Discussion

Our goal was to test the hypothesis that a task’s time to completion would be increased by deadline changes (as an indicator of the probability of missing a deadline), but less so for busy people. Since the dependent variable is a time duration variable and has a large range, we used a Cox regression (proportional hazard model) to test our predictions. This allowed us to model how the probability of task completion at any time is affected by deadline changes, busyness, their interaction, and the control variables. This type of regression models the “hazard” of task completion, which is the probability that a task that has not yet been completed by day t will be completed on day t . We expected that while increasing deadline changes would be associated with a decrease in the probability of task completion (i.e., an increase in time to completion), this effect would be reduced as a person’s busyness increased, resulting in a significant deadline changes by busyness

interaction). Note that we also conducted a normal regression and found results consistent with those reported next.

Results are reported in Table 1. The table shows a base model that estimates the effects of all control variables on the probability of task completion but excludes the variables of interest (deadline changes, busyness, and their interaction). The table also shows a full model that includes all control variables and the three effects of interest. Except for the binary control variables (first task, first week of month, last week of month, day of week, and month of year), all variables were standardized ($M = 0, SD = 1$). The full model fits better than the base model, and therefore we focus on its results. In the table we report the parameter estimate for each effect (B) as well as the hazard ratio ($HR = \exp[B]$). The hazard ratio is an indicator of how a one-unit increase in a variable affects the probability of task completion after controlling for the effects of the other variables. Put simply, HR greater than 1 (less than 1) indicates that an increase in the corresponding variable is associated with an increase (decrease) in the probability of task completion, which means that time to task completion is decreased (increased).

As expected, the effect of the number of deadline changes, which indicates the likelihood of having missed a deadline, on the probability of task completion was negative and significant, $B = -.30, HR = .74, \chi^2(1) = 25,541.59, p < .01$. Thus, changing a task's deadline increases the time it takes to complete a task. To

put this in perspective, the mean number of deadline changes for a task was .53 ($SD = 1.72$), and adding one deadline change reduced the probability of task completion by an average of 16%. Importantly, this effect was moderated by busyness with a significant positive interaction, $B = .012, HR = 1.01, \chi^2(1) = 117.49, p < .001$. The effect of busyness was also positive and significant, $B = .011, HR = 1.01, \chi^2(1) = 70.66, p < .001$. With respect to the interaction, the adverse effect of changing deadlines on task completion is reduced. This can be illustrated by comparing the mean time to completion for tasks with zero versus one or more deadline changes for users who were not busy (busyness = 0) or busy (busyness >0). For tasks created by users who were busy (busyness >0), the mean time to completion was 12.24 days when they had no deadline changes versus 25.54 days when they had at least one deadline change (difference = 13.30 days). In contrast, for tasks created by nonbusy users (busyness = 0), mean times to completion were 19.44 days for tasks with no deadline changes, and 37.63 days for tasks with one or more deadline changes (difference = 18.19 days). A comparison of the differences (13.30 days for busy people vs. 18.19 days for nonbusy people) illustrates the moderating effect of busyness. Although the simple effect of deadline changes on probability of task completion is always negative, it is less negative for busy people. Note that these results were unchanged when using the alternative operationalization for busyness (i.e., busyness just before the initial deadline was

Table 1
Effects on Probability of Task Completion (Study 5)

| Covariate | Base model | | | Full model | | |
|--|--------------------|------------|------|--------------------|------------|------|
| | B | χ^2 | HR | B | χ^2 | HR |
| Deadline changes | | | | -.30 | 25,541.59 | .74 |
| Busyness | | | | .01 | 70.66 | 1.01 |
| Deadline changes × Busyness | | | | .01 | 117.49 | 1.01 |
| User completion time | -.52 | 62,871.72 | .60 | -.54 | 67,766.31 | .58 |
| User completion rate | .05 | 829.22 | 1.05 | .04 | 449.92 | 1.04 |
| First task | -.02 | 37.46 | .98 | -.02 | 88.20 | .98 |
| First week of month | -.01 | 19.10 | .99 | -.01 | 27.95 | .99 |
| Last week of month | .00 | 7.95 | 1.00 | .00 | 8.16 | 1.00 |
| Day task created (baseline = Saturday) | | | | | | |
| Sunday | -.01 | 5.90 | .99 | -.01 ^{ns} | 1.27 | .99 |
| Monday | -.02 | 15.75 | .98 | -.01 | 4.15 | .99 |
| Tuesday | -.03 | 39.61 | .97 | -.02 | 23.50 | .98 |
| Wednesday | -.04 | 66.54 | .96 | -.04 | 47.33 | .96 |
| Thursday | -.09 | 300.76 | .91 | -.09 | 260.74 | .92 |
| Friday | -.01 | 4.43 | .99 | -.02 | 7.46 | .98 |
| Month task created (baseline = December) | | | | | | |
| January | .02 | 9.43 | 1.02 | .02 | 11.14 | 1.02 |
| February | .02 | 4.73 | 1.02 | .02 | 8.40 | 1.02 |
| March | .01 ^{ns} | 2.10 | 1.01 | .02 | 7.39 | 1.02 |
| April | -.01 ^{ns} | 2.66 | .99 | .00 ^{ns} | .18 | 1.00 |
| May | .02 | 6.18 | 1.02 | .03 | 23.79 | 1.03 |
| June | .04 | 37.35 | 1.04 | .06 | 72.47 | 1.06 |
| July | .06 | 67.94 | 1.06 | .08 | 119.79 | 1.08 |
| August | .14 | 409.15 | 1.16 | .15 | 461.32 | 1.17 |
| September | .25 | 1,121.15 | 1.29 | .26 | 1,143.81 | 1.29 |
| October | .01 ^{ns} | .44 | 1.01 | .02 | 4.36 | 1.02 |
| November | .00 ^{ns} | .24 | 1.00 | .00 ^{ns} | .07 | 1.00 |
| -2LL | | 14,359,721 | | | 14,320,079 | |
| AIC | | 14,359,765 | | | 14,320,129 | |
| BIC | | 14,360,013 | | | 14,320,411 | |

Note. These models estimate the effects of the covariates on the probability (hazard) of task completion. Unless indicated by "ns" all parameters are significant at the $p < .05$ level. HR = hazard ratio.

changed). The results were also consistent when we controlled for multiple tasks per user with either user random effects or user fixed effects, and if we restricted the analysis to the subset of tasks for which the deadline was changed at least once.

As another analysis, we used a variable that simply indicated if a task was completed after its initial deadline (late) versus on or before its deadline (not late). Although this measure is less sensitive than the deadline changes measure previously used, and not ideal for the reasons we described earlier, we expected it to generate consistent results. We estimated a similar Cox regression model as before, but with being late replacing the number of deadline changes as an explanatory variable. Consistent with the other analysis, the effect of a being late on probability of task completion was negative and significant, $B = -.48$, $HR = .62$, $\chi^2(1) = 117,504.98$, $p < .001$, and the late \times busyness interaction was significant, $B = .02$, $HR = 1.02$, $\chi^2(1) = 140.49$, $p < .001$. The effect of busyness was not significant, $p = .30$. When busyness was measured at the time of the first deadline change, the results were largely consistent, with the effect of being late significantly negative, $B = -.48$, $HR = .62$, $\chi^2(1) = 117,626.40$, $p < .001$, and the late \times busyness interaction significantly positive, $B = .014$, $HR = 1.01$, $\chi^2(1) = 99.00$, $p < .001$. The effect of busyness was also significant in this model, $B = -.02$, $HR = .98$, $\chi^2(1) = 137.00$, $p < .001$. Thus, using a different indicator of missed deadlines generally supports the previous studies' findings.

This final study examined 586,808 real tasks submitted by users of a popular task management "to do" list software application. The findings are overall consistent with our theory that missing a task deadline can lead people to take longer to complete a task, but that being busy, which was operationalized in two different ways, mitigates this effect.

General Discussion

This research examined how being busy influences motivation to complete a task, the time it takes to complete it, and the likelihood that the task is actually completed. We conducted this investigation in contexts in which people missed or did not miss a deadline for completing the task. Counter to extant research (e.g., Jacobs & Dodd, 2003), we found that having many tasks to accomplish can aid task completion. When people miss a deadline, they are more motivated to complete a task when they are busy compared to when they are not busy, an effect that is mediated by busy people's perception that they are managing time efficiently (Studies 1 and 2). As a consequence of this motivation, busy people become more likely to actually complete tasks than people who are not busy (Studies 3 and 4). This effect on task completion was demonstrated in naturalistic experiments, and using over half a million task records from a task management software application designed to help people manage their tasks (Study 5).

Previous research has demonstrated that failure can have a negative impact on motivation in several domains (Cochran & Tesser, 1996; Herman & Mack, 1975; Marlatt & Gordon, 1980; Vohs et al., 2013). The present research contributes to this literature by demonstrating that, when failure is due to a missed deadline, being busy can mitigate the sense of failure. Thus, while being busy may make people more likely to fail to achieve a specific goal (i.e., completing a task), it can also make people more

likely to achieve the goal by augmenting the perception that a different goal (i.e., using one's time effectively) is being achieved. These findings have theoretical implications for the goal pursuit and productivity literatures, and practical implications for how to help people become more effective at completing tasks.

Implications for Theory

How busy a person was when they violated a goal standard (i.e., missing a task deadline) was a key determinant of motivation in our studies. Being busy (vs. not busy) means that a person has more tasks that they are trying to achieve, which suggests that they may also have more active goals that are incomplete. Thus, having several active goals at the same time may be beneficial because it helps mitigate negative effects of violating any single goal. This account seems counter to the findings that unfinished goals tend to escalate (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). In our studies, the positive effects of being busy seem to have offset any negative effects associated with reminders of having several unaccomplished goals. Further research is needed to explore when each effect of having unaccomplished goals (i.e., busyness as fulfilling an effective time management goal vs. busyness as having many goals that have not been successfully accomplished) will determine motivation.

The fact that missing a deadline on one task goal can have an influence on people's perceptions of an alternative goal, in this case using time effectively, suggests that this cross-goal effect may generalize to other goal relationships. Consider a faculty member who has not published a paper during the academic year and received a poor research evaluation in their school's yearly review. This could lead to demotivation to publish papers. However, if this person received a high service or teaching evaluation that year, he or she could perceive that the goal of "being a good academic" was still being met, and remain motivated to publish papers. While this could be true, it is not clear that all goal dyads work this way. The relationship between missing a deadline and busyness is that both refer to an individual's ability to manage time effectively. Therefore, these cross-goal motivational effects may only occur in the domain of time management. If this is correct, the perception that a different goal is being achieved would be motivating to the pursuit of the other goal when they both refer to time management (a faculty member did not publish because the time was spent on important teaching and service activities) but not when they refer to other factors (a faculty member did not publish because he or she could not say no to the chair's teaching and service requests). Therefore, there seems to be something special about being busy and engaged in activities that can increase motivation to achieve an array of other goals at which an individual failed.

Support for the predictions above may come from connecting our findings to related streams of research, namely Goal Systems Theory (Kruglanski et al., 2002). This theory suggests that the goal system is a cognitive structure like many others, connected in a hierarchy involving superordinate goals, goals, subgoals, and means to goal achievement. If time efficiency is a superordinate goal, then each task an individual wants to complete is a goal connected to that superordinate goal. When there is a failure associated with one goal, busyness signals that the superordinate goal is still being accomplished, and this motivates individuals to pursue the goal. These findings seem inconsistent with research

showing that a perception of progress toward a superordinate goal may decrease motivation to pursue the goal (Fishbach, Dhar, & Zhang, 2006). This inconsistency can be resolved in two ways. First, progress typically refers to being at the initial versus end stages of goal pursuit. Here, we look at how apparent failures can maintain a perception of progress, which means the motivational system may respond differently, independently of the goal pursuit stage, when an apparent lack of progress signals that progress is still being made toward the superordinate goal. Second, progress leads to decreased motivation when goals are complementary (e.g., a person wears less sunscreen when wearing a hat), which is not the case in the current research. The tasks that made our participants busy were not in general complementary of the missed deadline task, meaning that the motivational system may respond differently when the goals representing progress are competing with, rather than complementary to, the focal goal.

Our findings are consistent with research on causal attributions, which demonstrates that people are more motivated to engage in an activity after failure when they attribute the cause of the failure to situational factors, as opposed to internal factors such as one's ability (Weiner, 1985, 1986). When people miss a task deadline due to an unexpected event—a situational factor—they are more motivated to complete the task compared to when there is no salient situational cause for missing the deadline (i.e., no unexpected event). Although we do find that busyness primarily increases task motivation in the absence of an unexpected event for missing a deadline, this does not necessarily mean that causal attributions could not play a role in these circumstances. It is possible that when busy people miss a deadline they attribute the cause to the other tasks they have to accomplish (i.e., situational factors). This increased attention to the other tasks may lead people to realize that they are using their time effectively. Thus, the process of attributing a cause for missing a deadline may result in the perception that one is using time effectively. Future research is necessary to better understand the relationship between busyness, causal attributions and the perception that time is being used effectively.

Relatedly, our findings have implications for the self-efficacy literature, which investigates how people's belief in their capability of performing a behavior influences motivation (Bandura, 1977). While failures lower self-efficacy perceptions, being busy may augment these perceptions, or at least keep them from decreasing, by allowing people to attribute the cause of missing the deadline to factors other than their own ability. These findings are consistent with, and offer a qualification, to recent findings on how people have aversion to being idle, and use general activity to feel better about who they are (Hsee et al., 2010). Our findings suggest the importance of examining a general versus more specific effect of busyness on self-efficacy. While being busy seems to make people more confident about who they are and what they can achieve, its impact on these perceptions may be specific to situations where busyness is relevant, such as the ones presented here. This does not refute the belief that our society places increased emphasis on the idea that being busy is desirable, valuable, and sometimes laudable. Rather, it calls for a deeper look at when busyness is indeed desirable, or even adaptive. Future research needs to investigate additional domains, and possible boundaries, of the influence of busyness on self-efficacy perceptions.

Our findings also have implications for the self-perception literature, which indicates that people use their own behavior to form perceptions of who they are, which increases the likelihood that they will perform the same behavior (Bem, 1972). Here, not performing a behavior (i.e., missing a deadline) increased the likelihood of later performing the behavior. One way to reconcile our findings with those of self-perception theory is to argue that busyness generated a perception that one is an "individual who knows how to manage their time." This perception, in turn, motivated behavior. Future research could add to the self-perception literature by examining when the performance of behaviors in unrelated domains influences self-perception specific to a focal domain, motivating people to perform additional self-perception-consistent behaviors within that domain. These findings also contribute to what we know on dispositional traits versus contextual influences on productivity. The mere perception that one is using their time effectively can influence motivation and actual efficiency at completing tasks. Previous research has conceptualized the motivation to engage in productive activity as a personality trait (Keinan & Kivetz, 2011), which suggests that productivity may be based on stable characteristics. The present research demonstrates that people's efforts at being productive are also determined by their subjective sense of using time effectively, which can be influenced by context. This offers an additional account of why productive people are more effective with their time: productive people may be better at managing failure. They may have a more stable sense of their own effectiveness, which allows them to remain engaged in tasks once an inevitable deadline is missed.

Implications for Productivity

Our findings also have a number of implications for individuals' productivity in both personal and professional contexts. A simple way for people to become more productive is to remind themselves of all the tasks they need to do. Thinking about all the tasks one needs to do should make individuals aware that they are busy. This should make people feel that they are achieving the goal of using their time effectively. As a consequence, people should not disengage from tasks they have failed at because of poor time management. Instead, people should be motivated to complete the task, and become more productive overall.

In a workplace setting, purposively keeping people busy may be a simple and effective antidote to chronic procrastination and task-completion tardiness. For example, managers may find that their subordinates are more likely to be productive if they give them more, not less, to do. There are likely, however, limits to this. We expect that extremely busy people will feel "overloaded" and "overwhelmed" by what they need to achieve, which could lead them to disengage entirely from a task. Thus, the potential of being busy to help increase productivity should be balanced against individuals' feelings of being overloaded and their perceptions of what "being busy" means to them.

Rather than actually giving people more tasks, simply making people feel busier could be effective in increasing productivity. For example, employers could break larger tasks down into smaller subtasks and communicate those as a way of increasing an employee's perceived busyness without actually giving them extra work to do. Additionally, people could use a busyness-related mechanism (e.g., list every single task they have been assigned at

work) to overcome a reduction in motivation to complete a task. Overall, individuals can benefit in both their personal and work lives from being busy in the all-too-common context of missed deadlines, as being busy helps them increase their productivity.

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Correction to Wilcox et al. (2016)

In the article “How Being Busy Can Increase Motivation and Reduce Task Completion Time” by Keith Wilcox, Juliano Laran, Andrew T. Stephen, and Peter P. Zubeck (*Journal of Personality and Social Psychology*, 2016, Vol. 110, No. 3, pp. 371–384. <http://dx.doi.org/10.1037/pspa0000045>), the affiliation of the author Andrew T. Stephen was incorrectly listed in the byline and the author note. The author is affiliated with the University of Oxford. The author note paragraph “Andrew T. Stephen is now at the University of Oxford” should have been omitted. The online versions of this article have been corrected.

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