The Impact of Goal Progress Velocity on Affect While Pursuing Multiple Sequential Goals

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Abstract

Past research has identified velocity (i.e., rate of goal progress) as a determinant of individuals' affective experiences during goal pursuit. Specifically, rapid progress is a pleasant experience, whereas slow progress is unpleasant. However, past work has emphasized situations in which individuals are unsure of whether or not they will meet their goal. This is problematic because many tasks are simple and routine, leaving little doubt that they can be accomplished in the time allotted. Is velocity related to affect in situations in which success is assured? And if so, *why*? To answer these questions, we conducted two experimental studies (N = 147 and 179) in which participants completed two simulated work tasks for which success was practically assured. Across both studies, velocity while performing the *current* task resulted in greater expected time available (ETA) to work on the *next* task. Downstream, ETA predicted happiness, but only if the next task was expected to be enjoyable (S1) or financially rewarding (S2). These studies indicate that velocity can impact affect by shaping expectations regarding the amount of time available for the next task. Nonetheless, the current studies also suggest that fast velocity may not universally result in positive affect; instead, fast velocity may only be met with positive affect if the next task is anticipated to be pleasant or rewarding.

Keywords: velocity; affect; time; goal; self-regulation

Goals guide behavior across a wide range of domains (e.g., Carver & Scheier, 1998; Locke & Latham, 2002). For instance, dieters exercise to lose weight, athletes practice in order to win championships, and employees work long hours to earn promotions. Importantly, goals are typically not achieved instantaneously, but instead are pursued over time. Thus, in addition to monitoring goal progress, individuals also monitor *velocity*, defined as the rate at which progress is made (Carver & Scheier, 1990). In particular, velocity determines the way it *feels* to pursue a goal; rapid progress is associated with positive emotions such as happiness and excitement, and slow progress results in negative emotional states, such as sadness and frustration (Beck, Scholer, & Hughes, 2017; Lawrence, Carver, & Scheier, 2002; Wilt, Bleidorn, & Revelle, 2017). Given affect's well-established influence on goal-striving behaviors and outcomes (e.g., Ilies & Judge, 2005; Richard & Diefendorff, 2011; Schmitt, Gielnik, & Seibel, in press), it is important to fully understand velocity's influence on affect. However, there are important limitations to the inferences that can be drawn from the velocity literature.

Specifically, previous velocity research has primarily emphasized goal-striving situations characterized by uncertainty regarding whether or not a goal can be achieved. Although such situations are common, for many goals success is more or less a given (Fisher, 1993; Loukidou, Loan-Clarke, & Daniels, 2009). Examples include filing paperwork, completing a workout, and preparing dinner. Critically, such tasks are relatively simple and do not necessarily need to be completed within some precise and stringent deadline. Yet, the velocity literature provides little insight into the link between velocity and affect in these situations. Does velocity influence affect in contexts in which success is relatively certain? And if so, why? The current research was designed to address these questions.

The Relationship Between Velocity and Affect

Carver and Scheier (1990, 1998) proposed that velocity plays a central role in shaping individuals' experiences during goal pursuit. Specifically, these authors argued that during goal pursuit individuals compare their current velocity to an internal referent, which represents a desired rate of progress. Individuals experience fast velocity when their current velocity exceeds the referent, and slow velocity when their current velocity falls short of the referent. In turn, individuals' perceived velocity relative to the referent is theorized to trigger affective reactions, such that fast velocities lead to positive affect, and slow velocities lead to negative affect.

Empirical research has largely supported Carver and Scheier's (1990, 1998) theorizing; fast velocity tends to be experienced as more pleasant than slow velocity (Johnson, Howe, & Chang, 2013). For instance, Lawrence et al. (2002) experimentally manipulated velocity and found fast velocity led to more positive affect compared to slow velocity. Likewise, velocity has been linked with affective outcomes in naturalistic settings, including among students pursuing academic goals (Elicker et al., 2009; Wilt et al., 2017) and adults pursuing goals in the workplace (Chang, Johnson, & Lord, 2010). More so, in the studies conducted by Elicker et al. and Chang et al., velocity was an important predictor of affect even after controlling for the amount of goal progress made. Thus, velocity appears to be a key determinant of affect during goal pursuit.

Nonetheless, velocity research has largely been conducted within situations in which there is uncertainty regarding whether or not the goal can be met. Within these situations the link between velocity and affect may be driven, at least in part, by beliefs regarding the likelihood of meeting the goal. Indeed, Carver and Scheier (1990) suggested that velocity is linked to a "hazy and nonverbal sense of outcome expectancy" (p. 23), such that slow velocity might lead to doubt regarding the likelihood of achieving the goal, whereas fast velocity may lead to confidence.

There is some empirical support for this position. Huang and Zhang (2011) manipulated velocity as individuals strived to attain goals (e.g., fundraising, earning customer loyalty rewards) within a specified timeframe and observed a positive relationship between velocity and beliefs about the likelihood of meeting the goal. Although Huang and Zhang did not examine affective outcomes, their results nonetheless highlight expectancy as an important outcome of velocity. Likewise, Chang et al. (2010) found positive relationships between velocity, expectancy, and performance satisfaction (i.e., an affective outcome) in an experimental study in which participants completed an ambiguous verbal task. Thus, within situations in which success is relatively uncertain, expectancy may be an important mechanism linking velocity to affect.

However, past research has not examined the relationship between velocity and affect in situations in which success is practically assured. This represents an important limitation because individuals frequently pursue simple and routine goals for which success is virtually certain. There is reason to believe that velocity may also influence affect within such contexts. For instance, Beck et al. (2017) found that velocity influenced affect, independent of velocity's implications for meeting the goal. These authors conducted two experiments in which they compared the effects of velocity disturbances (which caused participants' rate of progress to slow down) with the effects of distance disturbances (which caused participants to lose progress) on emotions. Importantly, the studies were designed such that both types of disturbances had equivalent effects on participants' likelihood of reaching the goal within the deadline. Beck et al. found that although both types of disturbances had comparable effects on frustration and enthusiasm initially, the effects of the distance disturbance faded over time, whereas the effects of the velocity disturbance persisted. These studies indicate velocity can influence affect independent of expectancy.

The Huang and Zhang (2011) studies also provide evidence to this point. Although these authors found velocity to influence effort via expectancy beliefs, this effect was only present during early stages of goal pursuit when success was in doubt. Conversely, later in goal pursuit, after participants had made ample progress, the relationship between velocity and effort was mediated by perceptions of *when* (but not *whether*) the goal would be met. As stated above, Huang and Zhang did not include affective measures in their studies; nonetheless, these results indicate that velocity may serve as a signal of the amount of time required to complete a task, which may have downstream implications for affect. In other words, even in contexts in which a person is relatively sure to complete the task at hand, the amount of time required to do so likely has implications for affect.

Expected Time Available for the Next Task

Individuals frequently have numerous tasks to accomplish within a day, and upon completing any given task individuals often move on to the next (Beal, Weiss, Barros, & MacDermid, 2005; Sun & Frese, 2013). Given a finite pool of time available to complete multiple tasks, faster velocity during the current task indicates that more time will be available to allocate toward subsequent tasks and activities. Indeed, because velocity is defined as distance (i.e., goal progress) divided by time, velocity is inversely related to the amount of time needed to complete a task. Drawing on Huang and Zhang's (2011) results, we argue that individuals use velocity perceptions to form expectations regarding the amount of time needed to complete the current task, which in turn informs the amount of time that will be available for the next task. As such, we predict that perceived velocity will be positively related to *expected time available* (ETA) for the next task (*H1*).

Next, we expect ETA for the *next* task to influence affect experienced while completing the *current* task. In this paper we focus on the experience of *happiness*, a highly activated and positively valenced state, and *sadness*, which is a low-activation, negatively valenced state. This focus is based on prior theory and research suggesting that happiness and sadness are particularly relevant affective states during goal pursuit (Carver & Scheier, 1998; Higgins, 1997). We expect ETA to relate to affect because time is a valued resource which allows individuals to carry out their tasks and activities (e.g., Beck & Schmidt, 2018; Ballard, Yeo, Loft, Vancouver, & Neal, 2016). Therefore, we expect ETA for the upcoming task to be positively related to happiness and negatively related to sadness. Yet, the degree to which having time available to complete a task is associated with affect is likely to depend upon the *valence* associated with that task, where valence is defined as the "importance, attractiveness, desirability, or anticipated satisfaction with outcomes" (Van Eerde & Thierry, 1996, p. 576). Specifically, we expect an individual who anticipates having a great deal of time to spend on an enjoyable and/or rewarding task to feel happy or excited, whereas anticipating a great amount of time available to spend on an unrewarding task is less likely to produce the same affective response.

Therefore, we expect an ETA x valence interaction on affect. Specifically, we expect a positive relationship between ETA and happiness, and expect this relationship to be stronger if the next task's valence is high as opposed to low (*H2a*). Likewise, we expect a negative relationship between ETA and sadness, and expect this relationship to be stronger if the valence associated with the next task is high, as opposed to low (*H2b*). Finally, the combination of our hypotheses yields a moderated mediation model in which velocity indirectly impacts (1) happiness and (2) sadness via ETA (see Figure 1). That is, we expect these indirect effects to be stronger if the next task's valence is high as opposed to low (*H3a* and *H3b*).

Study 1

Method

Participants. Participants were 175 undergraduates from a Canadian university who received course credit for their participation. Eight participants encountered technical difficulties which prevented them from completing the study; these participants' data were excluded from analyses. Because the study was designed to be completed in 45 minutes, we also excluded participants with study completion times we deemed unfeasibly short (i.e., under 15 minutes; N = 11) or unfeasibly long (i.e., over 90 minutes; N = 9). We made this decision because participants with such extreme completion times were likely not fully engaged during the study.[1] Thus, we conducted our analyses on a final sample of 147 participants (53% female) with a mean age of 20.15 years (SD = 2.24). Most participants self-identified as White (N = 59) or Asian (N = 35).

Research design and overview. We used a 2 (*velocity*: fast vs. slow) × 2 (*valence*: high vs. low) between-subjects design with random assignment to conditions. The study was conducted online, meaning participants were free to complete the study at any time or location. Notably, the study used a dual-task paradigm in which participants completed (1) the Contract Task (i.e., the *current* task), followed by (2) the Hiring Task (i.e., the *next* task). We describe both tasks in detail below. Participants completed the tasks sequentially and could not switch back and forth. Importantly, participants had a common pool of 20 minutes to work on *both* the Contract Task and the Hiring Task. That is, participants spent some portion of the 20-minute period on the Contract Task, and after completing the Contract Task, any time that remained was spent working on the Hiring Task. Participants were provided with a specific example, along

[1] We also tested our hypotheses using other cut-off values. Changing the cut-off values did not substantively affect the interpretation of our results.

with a graphical representation of that example (see Figure 2), to ensure they understood this aspect of the study. The Contract Task was designed such that most participants would complete it well within the 20 minutes allotted for both tasks, thus leaving time available to work on the Hiring Task. Indeed, 140 out of 147 participants completed the Contract Task within the 20-minute period allotted to both tasks, with a mean completion time of 8.31 minutes (SD = 4.00).[2]

Procedure. The procedure is summarized in Figure 3. Following informed consent, participants were told they would perform a work simulation in which they assumed the role of a manager in a fictitious organization. As part of this role, participants would complete the Contract Task and the Hiring Task. Participants were told that they would complete both tasks sequentially, and that 20 minutes total would be spent across both tasks. Next, participants were provided with an overview of the Contract Task, which included on-screen instructions for operating the task, as well as a hands-on practice trial. Participants then read a brief description of the Hiring Task. Given the relative simplicity of the Hiring Task there was no practice trial, yet basic instructions were provided. The description of the Hiring Task included information regarding the valence of the task (i.e., the valence manipulation). This is described in more detail in the Manipulations section.

Following the instructions, participants began the Contract Task. Note that participants did not receive continuous feedback during the task. Instead, participants received performance feedback after completing the first 10 (out of 20) contracts. This feedback included the velocity manipulation, which we describe in more detail in the Manipulations section. Following the

[2] We also tested our hypotheses while excluding the 7 participants who did not finish the Contract Task within the 20-minute period. Excluding these participants did not substantively affect the interpretation of our results. Therefore, we present the results obtained with these 7 participants included.

feedback, participants completed measures of ETA, after which they completed measures of happiness and sadness. Next, participants completed the remaining 10 contracts. After completing the Contract Task, participants spent the remainder of the 20 minute period on the Hiring Task. Finally, participants reported their demographic characteristics.

Experimental tasks.

Contract Task. The object of the Contract Task was to compute the salary of 20 fictitious truck drivers for the upcoming year. First, participants retrieved the following pieces of information regarding the driver's performance from a database: distance driven, amount of cargo delivered, and value of cargo delivered. This was done by clicking buttons on the computer screen; when a button was clicked (e.g., the "distance driven" button) the value for that aspect of job performance was displayed. Next, participants determined each driver's new salary based on the performance data by applying a series of rules. These rules were very simple and were prominently displayed on the participants' computer screen. As such, performance did not require any knowledge or skills beyond simple addition and subtraction.

Hiring Task. The object of the Hiring Task was to evaluate job applicants using a scale ranging from 1 (*very poor*) to 5 (*very good*). Each applicant profile included the following information: years of education, years of job experience, and job interview score. There were no "correct" or "incorrect" answers; instead, participants were asked to provide a subjective evaluation of each applicant. Participants completed as many applicant ratings as possible within the time available (i.e., the time remaining after completing the Contract Task).

Experimental manipulations.

Velocity during the current task. The velocity manipulation used in this study was modeled after previous velocity research (Chang et al., 2010; Huang & Zhang, 2011). In particular, we manipulated velocity by delivering feedback to participants during the Contract Task. Participants completed 20 contracts total. Feedback was delivered halfway through the contract task (i.e., after participants had completed the first 10 contracts). Critically, this feedback included the velocity manipulation. Specifically, regardless of their *actual* velocity, participants in the fast velocity condition were told they were completing the Contract Task "very rapidly," whereas participants in the slow velocity condition were told they were completing the task "very slowly." Thus, we manipulated velocity by providing participants with a subjective evaluation of their velocity. Participants were also told the number of contracts they completed at that time (i.e., 10), along with the actual amount of time they had taken to complete these contracts. Thus, by combining participants' actual velocity (i.e., number of contracts completed divided by the amount of time taken) with the subjective velocity feedback, the manipulation conveyed to participants that their current velocity was either fast or slow *relative* to some referent. This manipulation was represented in our analyses using an effect coded variable (slow = -1, fast = 1).

Valence associated with the next task. The valence associated with the next task (i.e., the Hiring Task) was manipulated during the study instructions, before participants completed either experimental task. Specifically, participants were told that the purpose of the study was to examine individuals' experiences as they complete common workplace tasks. Participants in the *high* valence condition were told that the Hiring Task was best described as "interesting and engaging." In contrast, participants in the *low* valence condition were told that the Hiring Task was best described as "boring and annoying." As was done with velocity, we coded valence using effect coding (low = -1, high = 1).

Attention check. To ensure participants paid attention to the valence manipulation, we asked them to complete the following statement: "The Hiring Task is best described as ______." Participants' response options were "interesting and engaging" and "boring and annoying." To advance further in the study, participants needed to complete the statement correctly.

Measures.

ETA. We assessed ETA using a single-item: "I will have a great deal of time available to work on the Hiring Task." Participants provided responses on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). Although single-item measures are sometimes criticized for providing inadequate construct coverage, the use of a single-item measure is appropriate if the construct of interest is sufficiently narrow (Rossiter, 2002), as is the case for ETA.

Affect. To assess happiness and sadness we selected affective descriptors previously used in self-regulation research (e.g., Beck et al., 2017; Shah, Higgins, & Friedman, 1997). To assess happiness, participants rated the extent to which they felt *happy, excited,* and *enthusiastic* ($\alpha = .86$). To assess sadness, participants rated the extent to which they felt *sad* and *disappointed* (Spearman-Brown corrected [n = 2] reliability = .82). Both happiness and sadness were measured on a 5-point scale (1 = *very slightly/not at all,* 5 = *extremely*).

Analysis plan. We tested H1 through H3 using multiple regression. To test H1, we regressed ETA on participants' velocity condition. Because we sought to test indirect effects, we tested H2 while controlling for causally prior variables. That is, to test H2 we regressed affect on the ETA × valence interaction, controlling for velocity condition. To test H3a and H3b, we calculated the magnitude of our indirect effects by computing the product of the individual paths that constitute the indirect effect (i.e., velocity → ETA and ETA → affect), at each level of valence (Edwards & Lambert, 2007). Next, to test the significance of these indirect effects, we computed bias-corrected bootstrapped confidence intervals around each indirect effect with 10,000 bootstrap samples using Mplus (Muthén & Muthén, 2010).

Results

Measurement model. We conducted a confirmatory factor analysis (CFA) to test our proposed measurement model. Because ETA was measured using a single-item measure, it was not possible to test the fit of a three-factor model containing ETA.[3] Thus, we excluded ETA from the CFA and instead tested the fit of a two-factor model in which happiness and sadness each loaded onto separate factors. Our proposed model provided acceptable fit to the data based on conventional criteria, and fit the data significantly better than an alternative model in which happiness and sadness were collapsed into one factor (see Table 1). Thus, our CFA provided support for our measurement model.

Descriptive statistics. Means, standard deviations, inter-correlations, and reliabilities are displayed in Table 2. We present direct tests of our hypotheses below.

Hypothesis testing. In support of H1, velocity was positively associated with ETA ($b = .42$, $SE = .13$, $p = .002$, $R^2 = .06$). In other words, participants experiencing fast velocity while completing the Contract Task expected to have more time available to pursue the Hiring Task compared to participants experiencing slow velocity. We also tested H1 while controlling for participants' actual velocity. Because the amount of goal progress on the Contract Task was constant across participants (i.e., all participants completed 10 contracts prior to velocity manipulation), we operationalized actual velocity as the amount of time participants took to

[3] To test whether our single-item measure of ETA loaded onto its own factor, we conducted a principal components analysis (PCA) with oblique rotation of all the items used in the study. Results of the PCA indicate that the single ETA item loaded onto its own factor, and did not cross-load onto any of the other factors.

complete the first 10 contracts of the Contract Task. These analyses indicate that our velocity manipulation was significantly related to ETA (b = .43, SE = .13, p = .002), even after controlling for actual velocity, which was not significantly related to ETA (b = -.07, SE = .06, p = .213). These results indicate that ETA indeed varied as a function of our participants' perceived velocity relative to a standard as opposed to their actual velocity. Thus, for the sake of parsimony, the analyses summarized below do not include actual velocity as a control variable.[4]

Next, there was a significant ETA × valence interaction on happiness (see Table 3). Consistent with H2a, the relationship between ETA and happiness was significant and positive among individuals in the high valence condition (b = .14, SE = .07, p = .037) but non-significant among individuals in the low valence condition (b = -.05, SE = .07, p = .492; see Figure 4). Additionally, there was a significant ETA × valence interaction on sadness (see Table 3). However, the relationship between ETA and sadness was non-significant among individuals in the high valence condition (b = .03, SE = .06, p = .636), but significant and negative among individuals in the low valence condition (b = -.18, SE = .07, p = .005; see Figure 5). Thus, although the interaction was significant, the pattern of the interaction was the opposite of what we predicted, meaning that H2b was not supported. We return to these unexpected results in the next section.

Next, we expected a moderated indirect effect of velocity on *happiness* via ETA, such that the indirect effect would be stronger if valence was high as opposed to low. In support of H3a, this indirect effect was significant and positive if valence was high, but non-significant if

[4] We also conducted tests of all our hypotheses while including actual velocity as a control variable, which are summarized in the supplemental online materials. Note that the inclusion of actual velocity as a control variable did not substantively affect the interpretation of our results.

valence was low (see Table 4). We also expected a moderated indirect effect of velocity on *sadness* via ETA, such that the indirect effect would be stronger if valence was high as opposed to low. However, because H2b was not supported, H3b was also not supported.

Discussion

With regard to happiness, the results of Study 1 largely supported our hypotheses. Specifically, fast velocity while pursuing the Contract Task influenced happiness by indicating that more time would be available for the *next* task (i.e., the Hiring Task). Yet, our results indicate that fast velocity does not always result in more happiness compared to slow velocity, as evidenced by the significant ETA × valence interaction. Indeed, expecting a great deal of time available for the next task (as a result of fast velocity) only resulted in happiness if participants expected the next task to be pleasant.

However, our hypotheses with regard to sadness were not supported. Although we found a significant ETA x valence interaction on sadness, the pattern of that interaction was contrary to our prediction. Therefore, we believe this unexpected interaction may have been a type-I error. For one, the form of the interaction that was observed was not hypothesized a priori, and more importantly, to our knowledge no theoretical framework can account for the pattern of this interaction. As such, at this point we do not offer an interpretation of this interaction. Instead, we examined whether or not this interaction was replicated in Study 2.

Although the results of Study 1 generally supported our hypotheses, it is important to interpret these results alongside the limitations. First, Study 1 was conducted online, meaning we had relatively little control over the conditions under which participants completed the study. Namely, external distractions (e.g., noise, interruptions) may have prevented some participants from being fully engaged with the experiment. We attempted to minimize this limitation by excluding participants based on completion times, but it is still possible that some participants were distracted while completing the study. Second, in Study 1 we used a single item to measure ETA. Single-item measures are often criticized because their reliability cannot be estimated and because the construct of interest is often too broad to be adequately captured by a single item. Although ETA is a fairly narrow construct that may be reasonably measured via a single-item (Rossiter, 2002), we nonetheless sought to address this limitation in Study 2.

To this end, we designed Study 2 to replicate the results of Study 1 and address the limitations listed above. First, whereas Study 1 was conducted online, we conducted Study 2 in a laboratory to reduce the influence of external distractions on participants' engagement with the experimental tasks. Second, we developed a multiple item measure of ETA to address concerns regarding the single ETA item used in Study 1. In addition to addressing these limitations, we also sought to extend the results of Study 1 by using a different manipulation of valence, as well as additional operationalizations of happiness and sadness. Critically, the use of different operationalizations of valence and affect across studies allows us to demonstrate that our results are not contingent on any one specific feature of the experimental design.

Study 2

Method

Participants. Participants were 198 undergraduates from a Canadian university who received course credit for their participation. In addition, participants could earn a bonus prize of $5.00 via a lottery performed after the study. We excluded participants who incorrectly responded to any attention check question (N = 19), resulting in a final sample of 179 participants (73% female), with a mean age of 20.36 years (SD = 2.30). Most participants identified themselves as Asian (N = 74) or White (N = 61).

Procedure. The procedure for Study 2 was almost identical to that of Study 1, with the following exceptions. First, whereas Study 1 was conducted online, Study 2 took place in a laboratory. Second, we used a different valence manipulation in Study 2, which we describe below. Third, whereas participants in Study 1 had 20 minutes to complete both the Contract Task and the Hiring Task, participants in Study 2 had 12 minutes to complete both tasks. This change was made to ensure the total length of the study did not exceed the 30 minutes allotted for the lab session. Because participants in Study 1 completed the Contract Task in 8.31 minutes on average (*SD* = 4.00), we believed that a 12-minute time limit for both tasks would allow participants to complete the Contract Task with time to spare for the Hiring Task. As expected, 178 out of 179 participants completed the Contract Task within the 12 minutes allotted to both tasks, with a mean completion time of 6.93 minutes (*SD* = 1.43).[5]

Experimental tasks. Participants completed the same tasks as in Study 1.

Experimental manipulations.

Velocity manipulation. We manipulated velocity in the same manner as in Study 1.

Valence manipulation. We manipulated valence by varying the degree to which performance on each task (i.e., the Contract Task and the Hiring Task) was instrumental for earning a $5.00 prize. Specifically, at the onset of Study 2 participants were informed that they would participate in a lottery to determine whether or not they would be paid $5.00. Importantly, participants were told that the total number of lottery entries earned depended on the number of contracts completed during the Contract Task, as well as the number of job applicants evaluated during the Hiring Task. Following completion of both tasks, participants drew tokens without

[5] As in Study 1, excluding the participant who did not finish the Contract Task within the 12-minute period did not affect the interpretation of our results. Therefore, we present the results we obtained with this participant included.

replacement from a bag containing 96 white tokens and 4 blue tokens. If any blue tokens were drawn the experimenter paid the participant the $5.00 prize, but if no blue tokens were drawn the participant was thanked and dismissed.

All participants were told that they could earn up to two lottery entries performing the Contract Task. Specifically, participants were told that the more contracts they completed, the more lottery entries they would earn, up to a maximum of *two* (i.e., they would be allowed to draw two tokens from the bag). Participants were not told a precise relationship between the number of contracts completed and the number of lottery entries they would earn; instead participants were simply informed that more contracts completed would correspond to more lottery entries. However, because the Contract Task was designed such that all participants were expected to complete all contracts within the time allotted, all participants were given two lottery entries for completing the Contract Task. Thus, the valence associated with the *Contract Task* was constant across conditions. Instead, as was done in Study 1, valence was manipulated by varying the rewards associated with the *Hiring Task*.

Specifically, similar to the Contract Task, for the Hiring Task participants were told that the more job applicants they evaluated, the more lottery entries they would earn. However, the maximum number of draws varied by condition. Participants in the *high* valence condition could earn up to *five entries* completing the Hiring Task, whereas participants in the *low* valence condition could earn up to *two entries* completing the Hiring Task. As was the case with the Contract Task, participants were not told a precise relationship between the number of applicants evaluated and the number of lottery entries they would earn. Yet, it was made clear that that the greater the number of applicants they evaluated, the greater the number of entries they would earn. Therefore, the amount of time participants were able to spend performing the Hiring Task was ostensibly associated with the odds of obtaining the $5.00 prize. As such, time spent on the Hiring Task was more valuable for participants in the high valence condition, relative to the low valence condition. However, in reality participants simply received the number of lottery entries that corresponded to their valence condition, regardless of the number of applicants evaluated.

Attention check. We verified that participants paid attention to the study instructions and to our manipulations via five multiple-choice attention check questions: (1) "The object of the Contract Task is to ______," (2) "I will be able to earn up to ______ in the Contract Task," (3) "In the Contract Task, performance is determined by ______," (4) "The object of the Hiring Task is to ______," and (5) "I will be able to earn up to ______ in the Hiring Task." Participants were asked to select the correct ending for each statement among five response options. As noted in the Participants section, we excluded participants who incorrectly answered any of the attention check questions from our analyses.

Measures.

Affect. We measured happiness (α = .90) and sadness (Spearman-Brown corrected [n = 2] reliability = .73) in the same manner as in Study 1. Furthermore, to ensure the results obtained from Study 1 were not dependent upon the specific operationalization of affect, we also measured affect using the Discrete Emotions Questionnaire (DEQ; Harmon-Jones, Bastian, & Harmon-Jones, 2016). Importantly, the interpretation of the results did not change depending on whether the items used in Study 1 or the DEQ items were used to operationalize affect. As such, for the sake of expedience, and to facilitate comparisons with Study 1, we present the results using same items we used in Study 1 in text. The results of hypothesis tests using the DEQ items are included in the supplemental online materials.

ETA. In Study 1 we measured ETA with a single-item ("I will have a great deal of time available to work on the Hiring Task"). In Study 2, we supplemented that item with two additional items, yielding a 3-item measure ($\alpha = .92$). The additional items were: "In your opinion, how much time do you think you will have to complete the Hiring Task?" (1 = *A very small amount of time*, 7 = *A very large amount of time*) and "After the Contract Task, there will be a lot of time left for the Hiring Task" (1 = *strongly disagree* and 7 = *strongly agree*).

Analysis plan. All hypotheses were tested in the same manner as in Study 1.

Results

Measurement model. As shown in Table 5, our proposed model fit the data well, and fit the data significantly better than all alternative models, all of which fit the data poorly. Taken together, the results of our CFA provided support for our measurement model.

Descriptive statistics. Means, standard deviations, inter-correlations, and reliabilities are displayed in Table 6. We present direct tests of our hypotheses below.

Hypothesis testing. In support of H1, velocity was positively associated with ETA ($b = .94$, $SE = .10$, $p < .001$, $R^2 = .34$). As in Study 1, participants experiencing fast velocity while completing the Contract Task expected more time available for the next task compared to participants experiencing slow velocity. Additionally, as in Study 1, velocity was significantly related to ETA ($b = .92$, $SE = .09$, $p < .001$), even after controlling for actual velocity, which was not significantly related to ETA ($b = -.21$, $SE = .12$, $p = .081$). Thus, ETA varied as a function of perceived velocity relative to a standard, as opposed to actual velocity. Therefore, as in Study 1, we did not include actual velocity as a variable in the remainder of our analyses.[6]

Next, there was a significant ETA × valence interaction on happiness (see Table 7). As shown in Figure 6, the relationship between ETA and happiness was significant and positive if valence was high (b = .23, SE = .07, p = .001) but non-significant if valence was low (b = .00, SE = .07, p = .989). Thus, H2a was supported, replicating the results from Study 1. However, there was no significant ETA × valence interaction on sadness (see Table 7). Therefore, as in Study 1, H2b was not supported.

Finally, we expected a significant moderated indirect effect of velocity on happiness via ETA, with valence as the moderator. As shown in Table 8, this indirect effect was significant and positive among individuals in the high valence condition, but non-significant among individuals in the low valence condition. Thus, similar to Study 1, H3a was supported. H3b predicted a significant moderated indirect effect of velocity on sadness via ETA, with valence as the moderator. However, because H2b was not supported, H3b was not supported.

Discussion

In Study 2, we replicated the results of Study 1 using different operationalizations of valence and affect, as well as a multi-item measure of ETA. Briefly, velocity during the Contract Task (i.e., the *current* task) influenced happiness by indicating the amount of time available for the Hiring Task (i.e., the *next* task). Further, as in Study 1, this indirect effect was only significant if the valence of the Hiring Task was high as opposed to low. However, our

[6] As done in Study 1, we also tested our hypotheses with the inclusion of actual velocity as a control variable; these results are summarized in the online supplemental materials. As in Study 1, the inclusion of actual velocity in our analyses did not substantively influence the interpretation of our results.

hypotheses regarding sadness were again unsupported. Specifically, in Study 2 we did not observe any effect of velocity on sadness, regardless of whether valence was high or low. We return to these unexpected results in the General Discussion.

General Discussion

Past research has demonstrated the importance of velocity as a determinant of affect during goal pursuit (Johnson et al., 2013). However, most of that research has been conducted in contexts characterized by the pursuit of difficult goals within stringent deadlines. In contrast, little is known regarding the relationship between velocity and affect in contexts in which success is essentially assured. This is problematic because individuals regularly complete routine and simple tasks for which attainment is never really in doubt. Our findings address this gap by demonstrating that in such situations, velocity can influence affect by shaping expectations regarding the amount of time available for the *next* task. Yet, our results suggest that expecting a great deal of time for the next task is only met with happiness if the next task is pleasant (Study 1) or associated with a large reward relative to the current task (Study 2).

In addition to investigating the role of velocity in situations in which success is assured, the present research also speaks to the role of velocity within multiple-goal contexts. In particular, Carver and Scheier (1998) initially proposed that the positive affect associated with rapid velocity signals that good progress has been made on the current task, and that more resources (e.g., time, effort) should therefore be allocated towards competing demands. However, empirical studies on velocity have primarily focused on single-goal contexts, thus leaving a gap between theory and research. We addressed this gap by explicitly examining the mechanism linking velocity to affect during the completion of multiple tasks. Essentially, we demonstrate that fast velocity can lead to feelings of happiness by signaling that a great deal of resources, namely time, will be available for other tasks. As such, our results provide support for the idea that individuals use velocity information to regulate multiple goals.

Another critical implication of this research is that individuals may not always enjoy the experience of fast velocity. This represents an important departure from much of the past theory and research on velocity, which indicate that fast velocities feel better than slow velocities in general (Carver & Scheier, 1998; Johnson et al., 2013). However, Elicker et al. (2009) found this relationship to be stronger among individuals who attach a great deal of importance to the goal compared to individuals who attached little importance to the goal. Thus, their work suggests that perceptions regarding the *current* task may act as a boundary condition of the relationship between velocity and affect. Our results provide additional insights by suggesting that expectations regarding the *next* task may also act as a boundary condition. That is, the relationship between velocity and affect may also be stronger if the next task is expected to be highly rewarding. As such, the extent to which rapid progress is experienced as enjoyable might depend on the valence of the multiple tasks to be completed.

Although our hypotheses regarding happiness were supported across both studies, neither study provided support for our hypotheses regarding sadness. In Study 1, we found an ETA x valence interaction on sadness, however the pattern of this interaction was the opposite of what we expected. Likewise, in Study 2 the ETA x valence interaction on sadness was non-significant, leading us to conclude that the significant interaction observed in Study 1 may have been a type-I error. The valence manipulations used in the current studies may explain these unexpected results. Specifically, the low valence condition was associated with a “boring and annoying” task in Study 1, and with a small monetary gain in Study 2. As such, even in the low valence condition, the negativity associated with the Hiring Task likely pales in comparison to some of the tasks individuals carry out in their daily lives. Specifically, in everyday life there are numerous tasks that are generally considered to be highly unpleasant, such as speaking in public, dealing with irate customers, or laying off an employee. Such “strong situations” may be necessary to elicit the expected interactions on sadness. Thus, observing these interactions may require studies conducted within naturalistic settings.

Another possibility is that the relationship between velocity and affect may be more complicated than we theorized. Our expectation was that the mechanism linking velocity to both positive and negative affective states (i.e., happiness and sadness) would be same. This expectation is consistent with prior theory and research on velocity, in which positive and negative affect were often regarded as two opposite poles of the same construct. However, more recent research has challenged this view. Specifically, the magnitudes of observed correlations between positive and negative affect are often low (Barrett & Russell, 1999), and some research suggests that positive and negative affective states can co-occur (Larsen, McGraw, Mellers, & Cacioppo, 2004). As such, the fact that our hypotheses were supported for happiness, but not for sadness, may reflect substantive differences in the relationship between velocity and these different affective states. We believe that it is important for future research to identify the specific, and possibly different, mechanisms linking velocity to positive and negative affect.

Practical Implications

This research may provide insight into the planning of daily tasks. In particular, our findings suggest completing a task rapidly might be more enjoyable—and perhaps more motivating—if it means more time available to engage in a pleasant activity, relative to an unpleasant activity. As such, in some cases individuals may consider taking on tedious and unpleasant tasks at the beginning of the day, leaving pleasant and rewarding tasks for the end of the day. This strategy may allow a person to maintain positive affect throughout the day, because although the current task may be unpleasant, the individual is moving towards a more pleasant or rewarding activity. Further, such a strategy may motivate individuals to complete unpleasant tasks, and to do so rapidly. Yet, completing a task rapidly may not *always* be beneficial. Indeed, individuals sometimes sacrifice accuracy or safety to complete tasks rapidly (e.g., Beck, Scholer, & Schmidt, 2017; Brumby, Cox, Back, & Gould, 2013; Forster, Higgins, & Bianco, 2003). Thus, individuals may also need to carefully consider the tasks needing to be completed and identify which tasks can be done rapidly and which tasks require more deliberate (and slow) behaviors.

Limitations & Strengths

The implications of the current research must be interpreted with the limitations of the research methodology in mind. For instance, across both studies participants completed relatively simple and artificial work simulation tasks. Given the artificial nature of the tasks, it was critical for us to ensure that the experimental manipulations were effective. To this end, we included attention check questions to assess the extent to which participants read and paid attention to the manipulations. Our reasoning was that if the manipulations were effective, then participants should have been able to correctly answer the attention check questions. However, one limitation of attention checks is that they do not directly assess whether or not participants *believed* the manipulations. Nonetheless, we believe our use of attention checks over more traditional manipulation check questions was appropriate. Specifically, we were concerned that the use of manipulation checks may have imposed a demand characteristic upon the participants, which may have undermined the effectiveness of the manipulations. The use of attention checks over manipulation checks allowed us avoid this potential problem. Furthermore, the significant ETA x valence interaction on happiness suggests that the manipulations had the intended effect.

If participants did not believe the valence manipulation, we likely would not have observed this interaction. Taken together, the attention check questions and the significant ETA x valence interaction speak to the effectiveness of the manipulations used in the present studies.

Another limitation of the current research is that although the design used across both studies allowed us to manipulate high and low levels of valence, few tasks are entirely high or low in valence in naturalistic settings. For instance, individuals sometimes receive large financial rewards for tasks that are highly unpleasant, and may derive enjoyment from tasks from which they receive no tangible reward. As such, the difference in valence from one task to another might be smaller and less obvious in a field setting relative to the present studies. Thus, ETA for the next task might have weaker implications for affect in a field setting relative to a simulation.

Nonetheless, ETA might also have further reaching implications in a field setting, relative to a simulation. In the current studies, participants could not choose which task they would complete following the current task, yet in naturalistic settings individuals often choose which task to complete next. For example, after completing paperwork, a worker may choose to make progress on a project, respond to email, or take a short break. Thus, the relationship between ETA and affect might be stronger in a naturalistic setting compared to a work simulation. Future research is needed to examine this possibility.

Despite these limitations, the controlled nature of our studies is a key strength of the current research. In particular, the paradigm used across both studies allowed us to manipulate velocity and valence experimentally, thus allowing for strong causal inferences. Indeed, these manipulations allowed us to account for extraneous factors that would have otherwise obscured the interpretation of our results. For one, our velocity manipulation allowed us to demonstrate that our results were driven by individuals' *perceived* velocity rather than *actual* velocity. This is important because in natural settings, actual velocity is often confounded with the amount of goal progress made and the amount of time spent on the task. In the current studies, we accounted for these confounds by randomly assigning participants to different levels of perceived velocity. Additionally, the fact that we manipulated valence represents an important strength of the current research, as the *overall* valence of a task might vary as a function of many different factors. The controlled nature of our studies allowed us to vary one specific aspect of valence at a time, thus allowing for a more precise test of our proposed ETA × valence interaction.

Finally, our hypotheses were supported using different operationalizations of affect and valence across both studies. With respect to affect, we measured affect using items drawn from past research, yet in Study 2 we also measured affect using items from the DEQ (see supplemental online materials). Regarding valence, whereas in Study 1 we operationalized valence in terms of the next task's pleasantness, in Study 2 we operationalized valence as the number of draws that could be earned for a $5.00 lottery. Importantly, we obtained the same pattern of results across both operationalizations of affect and valence, meaning support for our hypotheses was not contingent on specific operationalizations. This consistency speaks to the robustness of our results, and thus constitutes an important strength of the current research.

Future Directions

What is the role of the initial task? The current research identified the upcoming task's valence as a boundary condition of the relationship between velocity and affect. However, the current manuscript remains silent regarding the role of the initial task. That is, how might the initial task's valence influence the relationship between velocity and affect? It is possible that the valence of the *initial* task and the valence of the *next* task both play similar roles in moderating this relationship. That is, manipulating the valence of either task may shape individuals beliefs regarding whether the upcoming task will be "better" or "worse" relative to the current task. Thus, rapid progress may feel pleasurable if the upcoming task is expected to be better *relative to* the current task, but less so if the upcoming task is expected to be worse than the current task. This also raises the possibility of rapid progress feeling more pleasurable when the current task's valence is low as opposed to high, as rapid progress on an unpleasant task may indicate that more time will be available for a *better* activity. Testing this possibility will require further research, specifically studies in which the valence of both the initial *and* the next task are manipulated.

Can velocity result in ambivalence? Although past velocity research has focused on individuals' experience of positive *or* negative affect, individuals may simultaneously experience positive *and* negative emotions—or ambivalence (Fong, 2006; Larsen et al., 2004). As such, future research should investigate whether there are situations in which velocity can lead to ambivalence. Carver and Scheier (1998) discussed two such situations in their theorizing. First, these authors suggested that rapid progress may lead to positive emotions by signaling that a desirable end state will soon be met, but that rapid progress may also lead to negative emotions by signaling that there will soon be no further goal to pursue. Second, velocity may produce ambivalence in the context of multiple-goal pursuit. Individuals have limited resources to meet multiple goals, meaning rapid progress towards one goal can result in slow progress toward a competing goal. Consequently, a person may feel positive emotions due to rapid progress on a focal goal, but also feel negative emotions due to slow progress on a competing goal. Examining whether or not velocity can produce ambivalence will result in a deeper understanding of the manner in which velocity shapes individuals' affective experiences during goal pursuit.

Conclusion

Past research has pointed to velocity as a key determinant of affective experiences during goal pursuit. However, previous work has not adequately represented situations in which individuals pursue simple and routine tasks for which attainment is never really in doubt. The current studies address this gap by demonstrating that in such contexts, individuals' expectations regarding the *upcoming* task are critical components of the mechanism linking velocity to affect. As such, our research provides new insights on individuals' affective experiences during goal pursuit. In our view, increased understanding of these experiences constitutes an essential step towards maximizing motivation and well-being.

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Table 1.
Confirmatory Factor Analysis Results for Study 1

	χ^2	df	$\Delta\chi^2$	Δdf	*p*	*RMSEA*	*SRMR*	*CFI*	*TLI*
One factor	293.44	7	277.67	1	< .001	.528	.521	.101	-.284
Two factor (Happiness vs. Sadness)	15.77	6	—	—	—	.105	.090	.969	.949

Note: Model comparison statistics ($\Delta\chi^2$ and Δdf) are in reference to the proposed two-factor model. When testing the fit of the different possible models, one of the sadness items ("disappointed") had a non-significant negative error variance. Based on recommendations from Dillon, Kumar, & Mulani (1987), we report the results of the confirmatory factor analyses with the error variance of that item set to zero.

Table 2

Means, Standard Deviations, and Intercorrelations for Study 1

	Mean	*SD*	*Correlations* 1	2	3	4	5
1. Velocity	0.01	1.00	-				
2. Valence	-0.01	1.00	.09	-			
3. Perceived Time Available	4.86	1.66	.25**	.05	-		
4. Happiness	2.24	0.97	.10	.14	.11	(.86)	
5. Sadness	1.63	0.92	-.23**	-.05	-.18*	.04	(.84)

Note: $N = 147$. $^*p < .05$, $^{**}p < .01$. Effect coding was used for both velocity (*slow* = -1, *fast* = 1) and valence (*low* = -1, *high* = 1). Where applicable, we report reliabilities on the diagonal, in parentheses.

Table 3
Regression results for Study 1

	DV = Happiness					DV = Sadness				
	b	*SE*	*p*	R^2	ΔR^2	*b*	*SE*	*p*	R^2	ΔR^2
Step 1: Main Effects										
Intercept	2.24	.08	<.001			1.63	.07	<.001		
Velocity	.07	.08	.413			-.18	.08	.023		
ETA	.05	.05	.303			-.07	.05	.123		
Valence	.12	.08	.121			-.03	.07	.704		
				.04	–				.07	–
Step 2: ETA x Valence interaction										
Intercept	2.23	.08	<.001			1.62	.07	<.001		
Velocity	.08	.08	.317			-.16	.08	.037		
ETA	.05	.05	.350			-.08	.05	.091		
Valence	.12	.08	.120			-.03	.07	.689		
ETA × Valence	.10	.05	.050			.11	.04	.017		
				.06	.02				.11	.04

Note: *N* = 147. ETA = Expected Time Available. Effect coding was used for both velocity (*slow* = -1, *fast* = 1) and valence (*low* = -1, *high* = 1).

Table 4
Mediation Test Results for Happiness (Study 1)

	VEL → ETA		PTA → Happiness		Mediation		
	b	*SE*	*b*	*SE*	Effect	LB	UB
Valence: High	.42	.13	.14	.07	.06 *	.001	.139
Valence: Low	.42	.13	-.05	.07	-.02	-.089	.038

Note: N = 147. VEL = velocity. ETA = expected time available. The lower (LB) and upper bound (UB) are based on the 95% confidence interval. * $p < .05$.

Table 5.
Confirmatory Factor Analysis Results for Study 2

	χ^2	df	$\Delta\chi^2$	Δdf	*p*	*RMSEA*	*SRMR*	*CFI*	*TLI*
One factor	889.37	21	849.92	3	<.001	.481	.283	.137	-.150
Two factor (ETA vs. Happiness + Sadness)	394.75	20	355.30	2	<.001	.324	.215	.628	.479
Two factor (Happiness vs. ETA + Sadness)	541.70	20	502.25	2	<.001	.382	.212	.482	.274
Two factor (Sadness vs. ETA + Happiness)	374.52	20	335.07	2	<.001	.315	.185	.648	.507
Three factor (Happiness vs. Sadness vs. ETA)	39.45	18	—	—	—	.082	.052	.979	.967

Note: ETA = Expected time available. Model comparison statistics ($\Delta\chi^2$ and Δdf) are in reference to the proposed three-factor model. When testing the fit of the different possible models, one of the sadness items (“disappointed”) had a non-significant negative error variance. Based on recommendations from Dillon et al. (1987), we report the results of the confirmatory factor analyses with the error variance of that item set to zero.

Table 6.
Means, Standard Deviations, and Intercorrelations for Study 2

	Mean	*SD*	*Correlations* 1	2	3	4	5
1. Velocity	-0.07	1.00	-				
2. Valence	-0.04	1.00	-.06	-			
3. Perceived Time Available	4.07	1.62	.58***	-.04	(.92)		
4. Happiness	2.17	1.02	.33***	.01	.31***	(.90)	
5. Sadness	1.49	0.72	-.22**	.05	-.26***	-.16*	(.73)

Note: N = 179. *p < .05, **p < .01, ***p < .001. Effect coding was used for both velocity (*slow* = -1, *fast* = 1) and valence (*low* = -1, *high* = 1). Where applicable, we report reliabilities on the diagonal, in parentheses.

Table 7.
Regression results for Study 2

	DV = Happiness					DV = Sadness				
	b	*SE*	*p*	R^2	ΔR^2	*b*	*SE*	*p*	R^2	ΔR^2
Step 1: Main Effects										
Intercept	2.19	.07	<.001			1.49	.05	<.001		
Velocity	.23	.09	.011			-.08	.06	.240		
ETA	.11	.05	.038			-.09	.04	.027		
Valence	.03	.07	.629			.02	.05	.635		
				.13	–				.08	–
Step 2: ETA x Valence interaction										
Intercept	2.20	.07	<.001			1.49	.05	<.001		
Velocity	.24	.09	.008			-.08	.06	.243		
ETA	.12	.05	.032			-.09	.04	.028		
Valence	.04	.07	.613			.02	.05	.635		
ETA × Valence	.12	.04	.009			.00	.03	.948		
				.16	.03				.08	.00

Note: $N = 179$. ETA = Expected Time Available. Effect coding was used for both velocity (*slow* = -1, *fast* = 1) and Task B Valence (*low* = -1, *high* = 1).

Table 8

Mediation Test Results for Happiness (Study 2)

	VEL → PTA		PTA → Happiness		Mediation		
	b	*SE*	*b*	*SE*	Effect	LB	UB
Valence: High	.94	.10	.23	.07	.22 **	.085	.360
Valence: Low	.94	.10	.00	.07	.00	-.130	.130

Note: N = 179. VEL = velocity. ETA = expected time available. The lower (LB) and upper bound (UB) are based on the 95% confidence interval. ** $p < .01$.

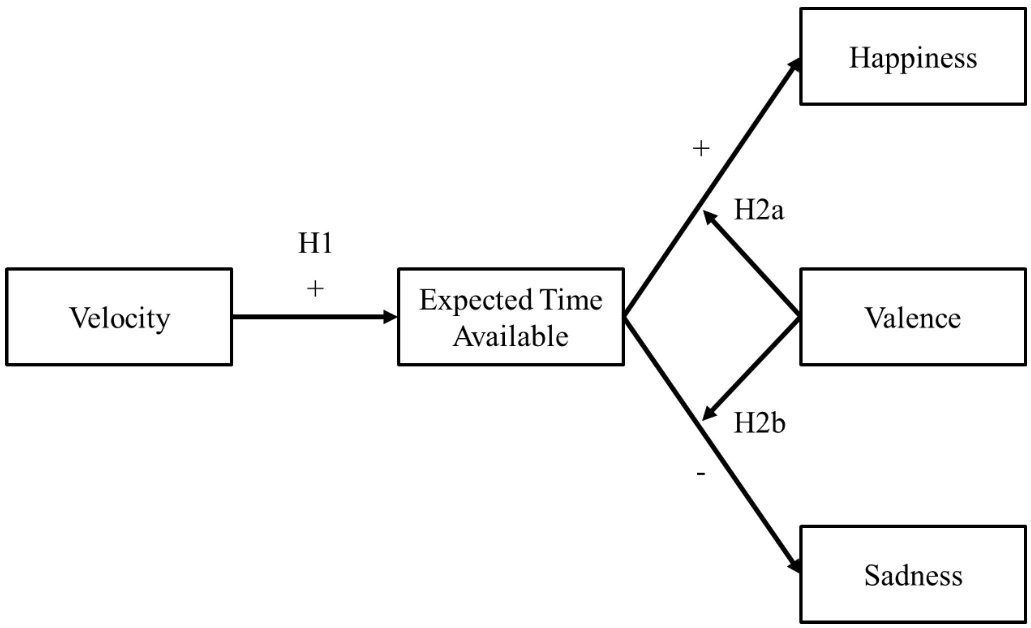

Figure 1. Proposed moderated mediation model.

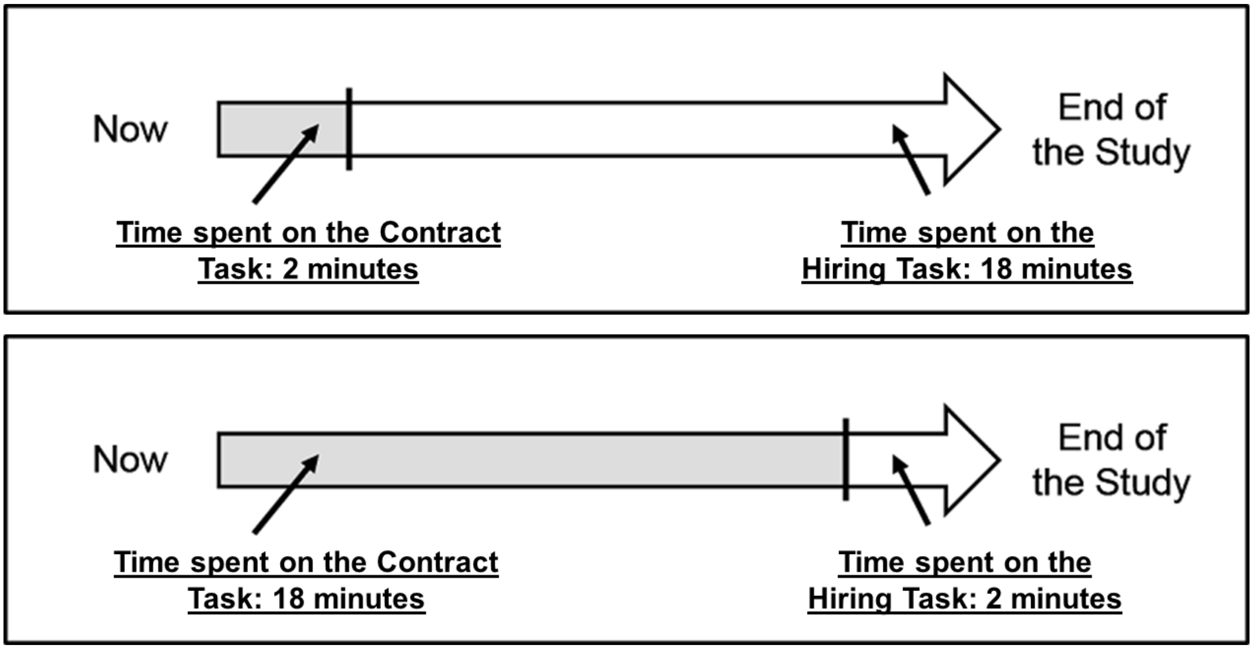

Figure 2. Example shown to participants during Study 1. This was done to highlight the fact that they would spend a total of 20 minutes across both the Contract Task and The Hiring Task.

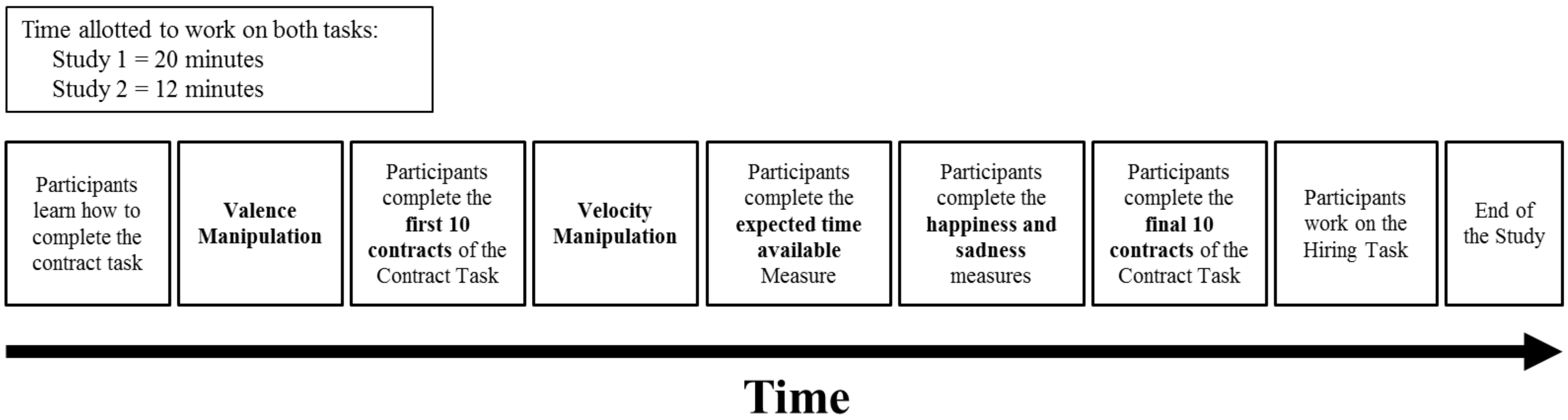

Figure 3. Study procedure used across both studies. Experimental manipulations are bolded.

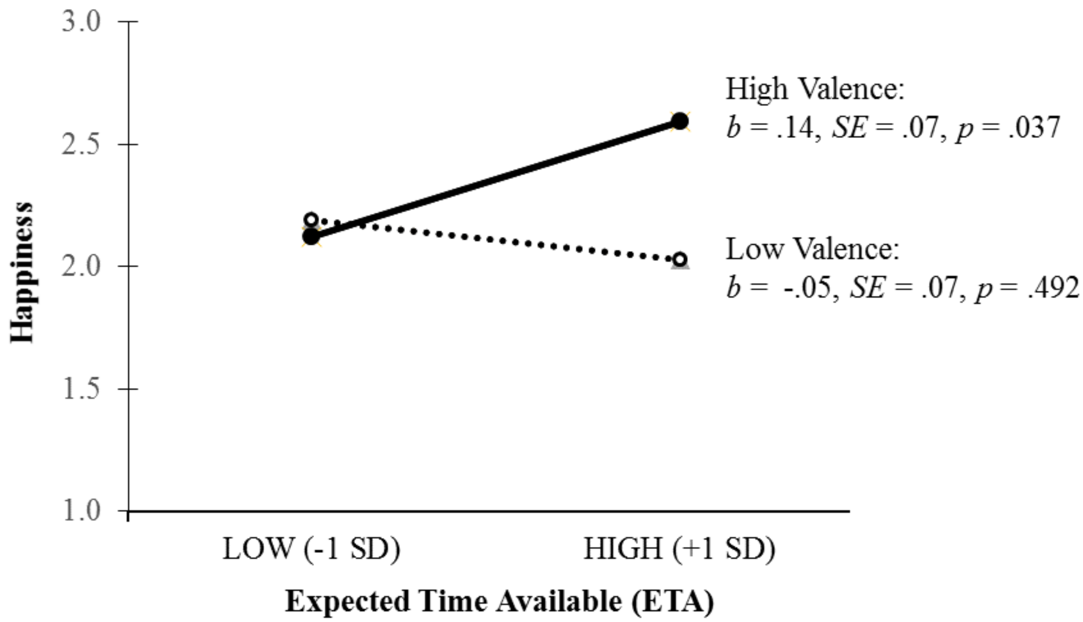

Figure 4. Interaction between expected time available and valence on happiness (Study 1).

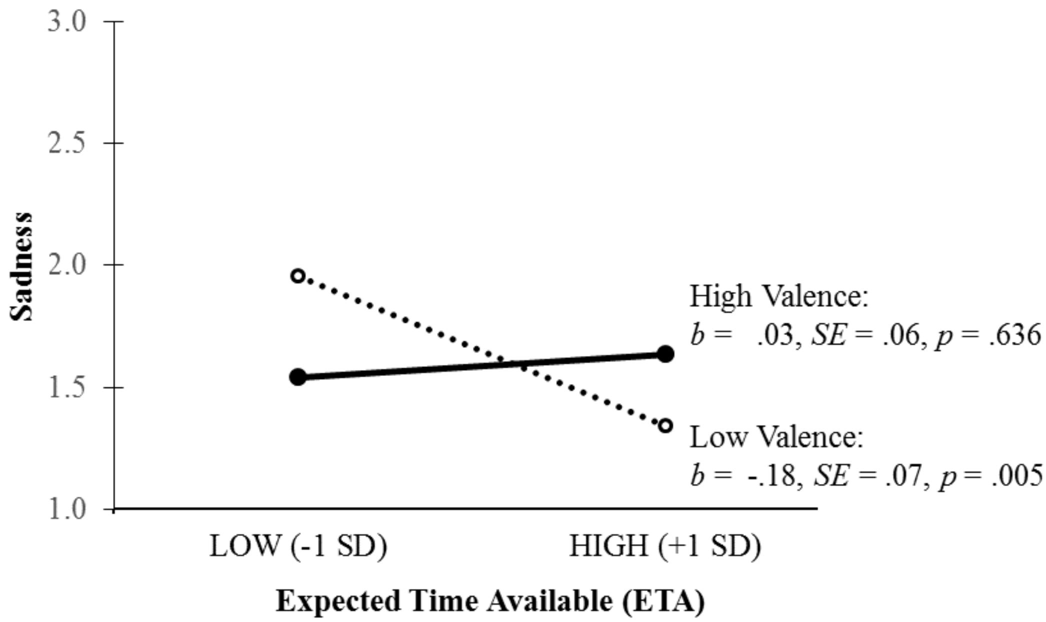

Figure 5. Interaction between expected time available and valence on sadness (Study 1).

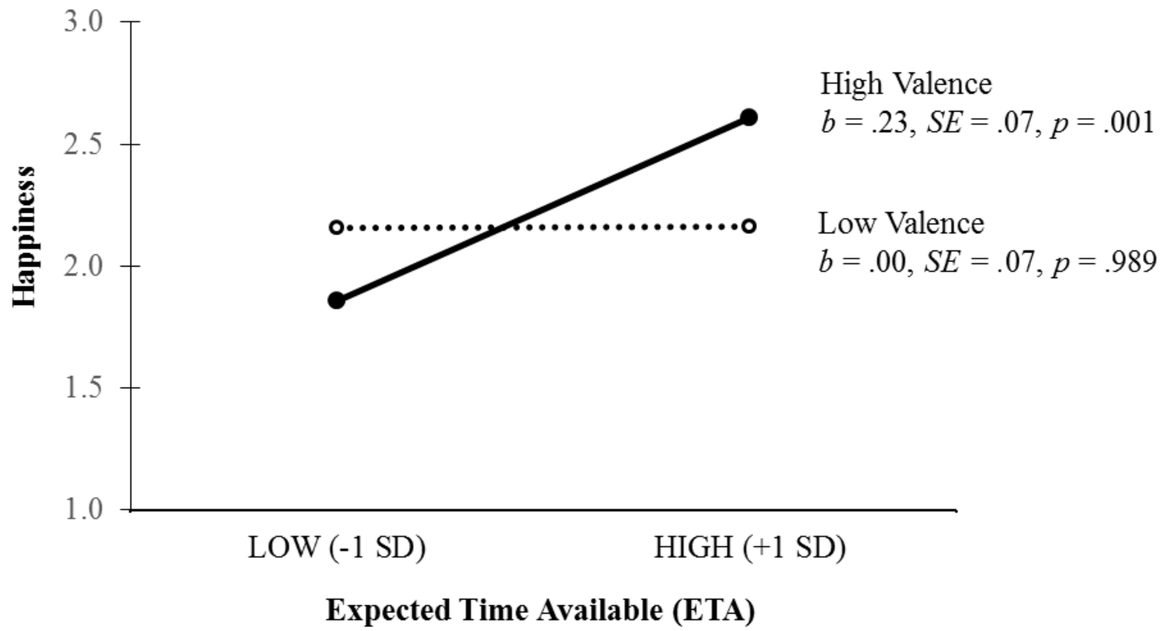

Figure 6. Interaction between expected time available and valence on happiness (Study 2).