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The Pain Was Greater If It Will Happen Again: The Effect of Anticipated Continuation on Retrospective Discomfort

Jeff Galak
Carnegie Mellon University

Tom Meyvis
New York University

Across 7 laboratory studies and 1 field study, we demonstrated that people remembered an unpleasant experience as more aversive when they expected this experience to return than when they had no such expectation. Our results indicate that this effect results from people's tendency to brace for unpleasant experiences. Specifically, when faced with the anticipated return of the experience, people prepare for the worst, leading them to remember the initial experience as more aversive. This bracing can be reduced either by limiting people's self-regulatory resources or by denying them the time to brace. These results indicate that people's tendency to remember aversive experiences as less unpleasant than they actually were (as demonstrated in prior research) does not necessarily imply that people are willing to re-engage in these experiences—because the anticipation of repeating the experience may counteract the initial memory bias.

Keywords: memory, bracing, expectations, aversive experiences

Although people generally pursue pleasant experiences, they sometimes choose to engage in experiences that are inherently aversive or have an important aversive component to them. For instance, individuals may suffer through an irritating task because their job requires it, or they may sweat through a grueling run because of the eventual physical and psychological rewards. Many times, people even consider repeating these activities in spite of their inherent aversiveness. Achieving professional objectives may require many repetitions of the same boring tasks, and becoming an elite distance runner certainly involves many grueling runs. Whether or not people choose to re-engage in these activities depends on the extent to which they remember the aversiveness of their experience: Individuals might be less likely to set out on another run if they accurately remembered the agony of every stride.

Perhaps fortunately, there are many psychological mechanisms that prevent people from reliving these aversive experiences to their truest extremes. For instance, individuals generally tend to focus on the positive memories while neglecting the negative memories of an experience (Mitchell, Thompson, Peterson, & Cronk, 1997; Sutton, 1992), and they have difficulty remembering the intense pain of an experience when they are in an incongruent, lower arousal affective state (Read & Loewenstein, 1999). This kindness of memory subsequently creates fewer aversive expectations and may entice people into partaking in the experience once more. Thus, people may not remember the true aversiveness of an irritating task or the stinging agony of a distance run, leading them to sign up for another task or plan another run.

However, this reasoning assumes that people's memory of the experience is not affected by their contemplation of repeating the experience. The studies reported in this article examined whether this indeed holds, or whether the prospect of repeating an experience can, in fact, change how people remember it. Even though it has been firmly established that affective memories influence expectations (Jones & McGillis 1976) and that those expectations influence affective experiences (e.g., Klaaren, Hodges, & Wilson, 1994; Wilson, Lisle, Kraft, & Wetzel, 1989), little is known about whether and how expectations for aversive experiences influence memories for these experiences.

We know that people's flawed memories produce less aversive expectations, but are their expectations equally kind to their memories? If people consider engaging in another irritating task, how will that consideration influence how they remember the previous task? One possibility is that the expectation of re-engaging in an unpleasant experience will magnify the aforementioned tendency to remember the experience as less aversive than it actually was. To reduce the dread associated with the prospect of an unpleasant experience, people may choose to convince themselves that the experience was not that bad after all. This is similar to the behavior of strategic optimists who choose to be optimistic about an uncertain event to savor the possibility of a positive outcome (Norem & Illingworth, 1993). Furthermore, some research has suggested that people can strategically increase their liking of an aversive experience when they anticipate having to go through a repeated series of these experiences. In particular, Gibbs (1992) observed that people rated a bitter drink as less aversive when they expected to consume it 20 times than when they expected to consume it only once. Gibbs argued that participants manipulated their taste to render their current situation less unpleasant. In summary, people

Jeff Galak, Tepper School of Business, Carnegie Mellon University; Tom Meyvis, Stern School of Business, New York University.

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Correspondence concerning this article should be addressed to Jeff Galak, 5000 Forbes Avenue, Pittsburgh, PA 15213, or Tom Meyvis, 40 West 4th Street, New York, NY 10012. E-mail: jgalak@cmu.edu or tmeyvis@stern.nyu.edu

may choose to remember an experience as less aversive if they expect to continue the experience, thus reducing expected disutility and increasing the likelihood of repeating the experience.

Yet, in contrast to the view that the anticipated repetition of an unpleasant experience may lead people to convince themselves that the experience was less aversive than it was, the studies presented in this article indicate that the anticipated repetition instead tends to increase the remembered aversiveness of the experience. Thus, although prior demonstrations of people's biased memory for unpleasant experiences have suggested that people can easily be enticed into repeating these experiences, the current research indicates that people may remember these experiences less fondly when they are actually confronted with the prospect of having to repeat them. In other words, whereas people's memories tend to be kind to their expectations, their expectations are decidedly less kind to their memories.

When Expected Repetition Makes the Past Seem Worse

Why would people remember an unpleasant experience as more aversive when they expect to return to that experience? We propose that the anticipated return to an unpleasant experience can cause people to brace for the worst, leading them to remember their previous encounter of that experience as more aversive. Indeed, people often choose to expect the worst of an upcoming experience in hopes of creating a more favorable contrast between their expectations and reality. Although this type of bracing can be part of a chronic tendency called *defensive pessimism* (Norem & Cantor, 1986a, 1986b), it can also serve as an occasional motivational strategy that is called on as needed (Carroll, Sweeney, & Shepperd, 2006; Nisan, 1972; Shepperd, Ouellette, & Fernandez, 1996; Taylor & Shepperd, 1998). Because people are generally more upset by unexpected negative events than by expected ones (Feather, 1966), bracing for the worst may increase subsequent well-being. Furthermore, although people are generally optimistic about uncertain outcomes, they tend to become pessimistic about the outcome as the event draws near (Carroll et al., 2006; Taylor & Shepperd, 1998). For example, students who predicted their exam scores immediately after taking an exam were generally optimistic. However, as the date when their scores were to be announced approached, they lowered their expectations to brace for the worst (Shepperd et al., 1996). Likewise, students who anticipated receiving news about a medical condition several weeks in the future were relatively optimistic about their likelihood of having the condition. However, when they anticipated receiving the results immediately, they predicted a much higher likelihood of being afflicted with the condition (Taylor & Shepperd, 1998). This malleability of people's expectations indicates that people can selectively activate a bracing strategy when they are motivated to do so. We propose that the expected continuation of an aversive experience is one particular situation in which people are likely to engage in bracing.

Thus, whereas participants in Gibbs's (1992) study reacted to anticipated repetition by perceiving the experience as less aversive (improving their current well-being by reducing dread), we propose that people often brace for repeated aversive experiences by perceiving these experiences as more aversive (improving their later well-being by inducing a favorable contrast between expected vs. actual aversiveness). Furthermore, in the context of repeated aversive experiences, bracing for the upcoming experience also has consequences for the recalled unpleasantness of the past experience. In particular, the enhanced dread of the upcoming experience also increases the remembered aversiveness of the past experience, consistent with people's tendency to reconstruct their past emotions on the basis of their current feelings (e.g., Levine, 1997). For instance, people who brace for the return of a sustained irritating sound increase the anticipated aversiveness of the upcoming sound and, by implication, the remembered aversiveness of their past exposure to the sound (thus increasing current dread but possibly reducing future distress).

In summary, we predicted that people would remember an unpleasant experience as more aversive if they anticipated returning to the experience. We propose that the effect of anticipation results from people's tendency to brace for the upcoming experience, enhancing their dread of the future and increasing the remembered aversiveness of the past. Although the studies we present are consistent with this bracing mechanism, several other mechanisms can also contribute to the predicted effect of anticipation on remembered aversiveness. These alternative mechanisms are discussed with the specific studies that address them and then summarized in the General Discussion section.

Overview of the Present Studies

The primary purpose of the present studies was to examine whether and how the expectation of returning to an aversive experience influenced people's memory of the experience. We present a series of seven laboratory experiments in which participants either listened to an irritating noise (Study 1) or completed an aversive task (Studies 2–7). Some participants anticipated having to listen to the noise again or having to complete the task again, whereas others did not. We found that those participants who expected to return to the aversive experience remembered their previous exposure to that experience as more aversive than did participants who believed they were done with the experience. We demonstrated that this effect was at least partly caused by participants' tendency to brace for the upcoming aversive experience and that this effect disappeared when people had limited self-regulatory resources, when people did not have the time to brace, or when the experience was enjoyable rather than aversive. A final field study demonstrated the robustness of this effect outside of a laboratory setting (Study 8). In particular, we demonstrated that, although women tended to remember their most recent menstrual period as less painful the more time had passed, they remembered it as more painful as their next period drew near.

Study 1

The goal of the first laboratory experiment was to test whether people who expected an unpleasant experience to return remembered this experience as more aversive (compared with people who did not expect the experience to return). All participants first listened to the same irritating sound (the noise of a vacuum cleaner) for the same amount of time, after which some were informed that they would later be listening to more of the noise, whereas others were told that they were done with the experience. We predicted that the anticipated return to the aversive experience

would cause participants to remember the previous experience as having been more aversive.

Method

Undergraduate students ($n = 30$; 21 women) completed the experiment in exchange for partial course credit. Participants were seated at a computer and were asked to put on a set of headphones. To obtain a baseline measure of participants' dislike of the stimulus, all participants first listened to a 5-s fragment of the irritating sound (vacuum cleaner noise) and then rated it on a 101-point unmarked slider scale anchored by *not irritating at all* and *tremendously irritating.* Next, participants listened to the target sound for 40 s and then were randomly assigned to one of two between-subjects conditions. Approximately half of the participants were told that they were done listening to the noise (the done condition), whereas the other half were told that in a few minutes, they would listen to more of the same noise (the more condition). All participants then completed an unrelated filler task for approximately 5 min and then indicated, on 9-point scales, how irritating the experience was (1 = *not irritating,* 9 = *terribly irritating*) and how hard it was to listen to the noise (1 = *not hard at all,* 9 = *extremely hard*). We chose a scale that differed from the scale used for the baseline measure to reduce the likelihood that participants would try to be consistent with their prior response. Finally, participants indicated how much they would (hypothetically) be willing to pay to avoid listening to the same noise for a full 10 min. To avoid unnecessary discomfort, no participants in this study (or in any subsequent study) were actually exposed to more of the stimulus.

Results and Discussion

The two primary measures of remembered aversiveness (irritation and hardness) were highly correlated ($r = .81$, $p < .001$) and were thus pooled into a single measure of aversiveness. An analysis of covariance (ANCOVA) on this single measure, using the baseline measure of aversiveness (i.e., their prior rating of the noise fragment) as a covariate, revealed an effect in the predicted direction.[1] Participants who anticipated listening to more of the noise remembered the original experience as more aversive than did those who thought they were done listening to the noise ($M_{more} = 5.92$, $M_{done} = 4.56$), $F(1, 27) = 4.40$, $p < .05$. This was confirmed with a similar ANCOVA on participants' willingness to pay to avoid listening to the noise for 10 min. Participants who anticipated more of the noise were willing to pay considerably more than participants who did not anticipate more of the noise ($M_{more} = \$3.62$, $M_{done} = \$0.94$), $F(1, 27) = 5.48$, $p < .05$.

Study 2

The first study demonstrated that the prospect of returning to an aversive sound caused participants to remember that sound as more irritating. In the second study, we tested the robustness of this effect by conceptually replicating it with a different aversive stimulus: a boring task.

Method

Undergraduate students ($n = 44$; 25 women) completed this study in exchange for partial course credit. Participants were seated at a computer and first went through a mildly tedious task to establish a baseline measure of boredom to be used as a covariate in the subsequent analyses. In this initial task, they were shown four objects on the screen and asked to indicate, as quickly as possible, which of the objects was a circle. To ensure that the task was tedious, participants completed 15 trials with a 3-s interval between trials, after which they rated the task on a 9-point scale (1 = *not at all boring,* 9 = *extremely boring*). Next, participants completed the focal task in which they had to drag a circle from the left side of the screen to a drop area located on the right side of the screen. Again, to ensure that the task was tedious, participants completed 50 trials with a 1.5-s interval between trials. Following completion of the last trial, participants were randomly assigned to one of two conditions. Approximately half of the participants were informed that they would be completing another 50 trials of the circle-moving task (the more condition), whereas the other half were told that they were done with the task (the done condition). Next, participants completed an unrelated filler task for approximately 10 min and then responded to our three primary dependent measures: Participants rated how irritating, annoying, and boring the task was using 9-point scales (1 = *not at all irritating/annoying/boring,* 9 = *extremely irritating/annoying/boring*).

Results and Discussion

In this and all subsequent experiments, the three primary measures of aversiveness—irritation, annoyance, and boredom—were highly correlated (all αs $> .9$) and were thus pooled into a single measure of remembered aversiveness. An ANCOVA on this new measure, using the baseline measure of task boredom as a covariate, revealed a reliable effect of the anticipation manipulation, $F(1, 42) = 5.40$, $p < .05$. As predicted, and consistent with the previous study, participants who anticipated completing more of the task remembered the original task as more aversive than did those who were done with the task (for the more condition, $M = 7.26$; for the done condition, $M = 6.56$).

Study 3

In the first two studies, people who anticipated returning to an unpleasant experience remembered that experience as more aversive than did those who were told they were done with the experience. These results are consistent with an increase in remembered aversiveness as a result of anticipated continuation (as we hypothesized) but are also consistent with a decrease in remembered aversiveness as a result of knowing the experience has finished. The next study was designed to distinguish between increased aversiveness in the more conditions and decreased aversiveness in the done conditions by adding a control condition in which participants had no expectation of either completion or continuation. If the previously observed effect was indeed caused by an increase in remembered aversiveness as a result of anticipated continuation, then participants in the more condition should remember the experience as more aversive than those in the control condition, and the responses of those in the control con-

[1] We report unadjusted means throughout this article. There were no reliable differences between conditions in the baseline measure in any of the studies.

dition should not differ from the responses of those in the done condition.

A second objective of this study was to provide a first test of the mechanism underlying the observed effect. We have proposed that people who expect an unpleasant experience brace themselves for the upcoming experience by imagining the worst, thus increasing the remembered aversiveness of the prior encounter with the experience. According to this account, participants in the more conditions prepared for the return of the irritating noise (Study 1) or the tedious task (Study 2) by bracing for the worst and, as a result, remembered the prior exposure to the noise or the task as more aversive than did participants in the done conditions. However, there is a plausible alternative explanation for the observed results. This alternative account relies on people's inability to fully appreciate high arousal states when they are in a low arousal state: the cold-to-hot empathy gap (Read & Loewenstein, 1999).

People often have a difficult time predicting the behavior of both others and themselves because they tend to use their present state as an anchor (Loewenstein, O'Donoghue, & Rabin, 2003; Read & Loewenstein, 1999). This is especially true when people in a low arousal (*cold*) state have to make predictions about those in a high arousal (*hot*) state (Loewenstein, 1996; Nordgren, van der Pligt, & van Harreveld, 2006). Generally, people in a cold state lack the ability to predict what it would be like to be in the more arousing hot state. This cold-to-hot empathy gap (Read & Loewenstein, 1999) is an important contributor to people's tendency to remember unpleasant experiences as less aversive than they actually were. At the time of recall, people tend to be in a cold state and have difficulty imagining the painful discomfort they experienced while in a hot state. However, when people anticipate returning to the aversive experience, the dread associated with the anticipated return may reinstate the hot state. This reactivation of the hot state would then make it easier to vividly remember how painful the experience truly was—possibly explaining why participants in the more conditions remembered the noise and the task as more aversive than those in the done conditions.

To distinguish between this empathy gap account and the bracing account, Study 3 tests whether the anticipation effect is dependent on the anticipated experience being the same as the remembered experience. We conducted this test by including an additional condition that was similar to the more condition, with the exception that the aversive task being anticipated was different from the one they had previously experienced. If the empathy gap account holds, then anticipating a different but similarly aversive experience should also increase the remembered aversiveness of the experience because it should also put people in a hot state. Indeed, previous research has shown that people can better imagine the emotional aversiveness of an event when they are put in a hot state, even when this hot state is caused by a different event (Van Boven, Loewenstein, Welch, & Dunning, in press). However, if the bracing account holds instead, then anticipating a different aversive experience may not affect the remembered aversiveness of the original experience. Indeed, convincing oneself that an upcoming experience is highly aversive necessarily implies remembering a previous encounter with this identical experience as equally aversive but does not necessarily imply remembering a previous encounter with a different experience as highly aversive.

Method

Participants from an online panel ($n = 112$; 88 women; median age = 32) completed the study in exchange for entry into a $50 lottery. To create a control condition in which participants assumed neither completion nor continuation, we changed the procedure to make the total number of tasks ambiguous. First, participants completed 15 trials of the same circle-moving task that was used as the focal task in Study 2. They then completed an unrelated study that lasted for approximately 5 min. Following this study, participants reported how irritating, annoying, and boring the first task was on the same 9-point scales used in Study 2. Next, participants again completed the circle-moving task but this time for 50 trials. By having all participants go through a first iteration of the task, rate the task, and then present them with a second iteration, we created the possibility that a task would be repeated after rating it (which was essential to create uncertainty about completion in the control condition). Participants were then randomly assigned to one of four conditions. Similar to the previous experiment, participants in the done condition were told that they were done with the task, and participants in the more condition were told that, in a moment, they would complete another 50 trials of the task. Participants in the more-of-other condition were told that, in a moment, they would complete a different task that also involved dragging objects on the screen. Finally, participants in the control condition were not given any information at this point. Next, all participants completed another unrelated 5-min filler task, after which they received a reminder of the completion or continuation information they had received prior to the filler task (corresponding to their condition). All participants then indicated how irritating, annoying, and boring the last iteration of the circle-moving task was, using the same 9-point scales as used in Study 2.

Results and Discussion

As can be seen in Figure 1, an analysis of variance on the pooled measure of remembered aversiveness revealed a reliable main effect of the anticipation manipulation, $F(3, 108) = 6.81$, $p < .001$. Unpacking this effect, we first observed a replication of our previous result: Participants who anticipated completing more of

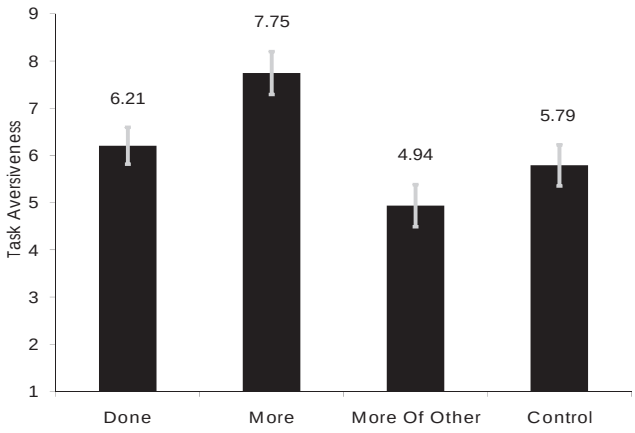

Figure 1. Remembered task aversiveness as a function of expectation of continuation (Study 3). Error bars represent standard errors.

the same task (the more condition) remembered the original task as having been more aversive than participants who did not expect to complete more of the task (the done condition), $F(1, 108) = 6.21$, $p < .05$. Next, participants in the control condition remembered the experience as less unpleasant than did those in the more condition, $F(1, 108) = 9.62$, $p < .01$, but they did not remember it differently from those in the done condition, $F < 1$, indicating that anticipation increases remembered aversiveness (rather than completion decreasing remembered aversiveness). Finally, we found that only anticipation of the same experience increased remembered aversiveness of the past experience. Specifically, responses from participants in the more-of-other condition were significantly lower than those in the more condition, $F(1, 108) = 19.49$, $p < .001$, and no different from those in the control condition, $F(1, 108) = 1.87$, *ns*.

The fact that remembered aversiveness was affected only when participants anticipated an identical experience provides some initial insight into the underlying mechanism of the effect. Specifically, the lack of an anticipation effect in the more-of-other condition is easier to reconcile with a bracing account than with an empathy gap account of the effect. Bracing for an upcoming task by imagining it to be aversive necessarily implies that the prior experience with that same task was dreadful as well but does not necessarily affect recall of a different task. In contrast, according to the empathy gap account, anticipating an aversive task makes it easier for people to reimagine the aversiveness of the previous task by putting them in a hot state, which can also be created by anticipating a task that is different from the original task.

Although the results of this study are more in line with a bracing explanation than with an empathy gap explanation, the possibility remains that the anticipation of a different object dragging task was not sufficiently specific to activate a hot state, in which case the cold-to-hot empathy gap could still account for these findings. As such, in the next studies, we attempted to provide additional insight into the underlying process by further examining the boundaries of the anticipation effect. In particular, the following studies demonstrated that the effect of anticipating the return of the experience disappears when people lack the time (Study 4) or resources (Study 5) to brace themselves, when the experience is pleasant rather than aversive (Study 6), or for people who are generally less likely to brace themselves (as measured by self-reported bracing in a different domain, Study 7).

Study 4

We have proposed that the anticipated continuation of an aversive experience increases the remembered aversiveness of that experience because people are strategically bracing for its return by preparing for the worst. If this is the case, then the effect should be reduced if we limit the time or resources available for bracing, because bracing and other forms of defensive pessimism require both time and resources to manifest (Norem & Cantor, 1986b; Norem & Illingworth, 1993). In Study 4, we tested this prediction by augmenting the procedure used in Study 2 with a new condition in which we limited the time to brace. In our previous studies, participants learned of their condition before a short filler task and reported their remembered aversiveness only after completing that filler task, thus giving participants in the more conditions ample time to brace for the upcoming task. In this new study, we added a condition in which participants learned only after the filler task that they would soon have to return to the boring task. This procedure limited their time to brace for the upcoming aversive experience because they learned of it immediately before they were asked to remember how aversive the original experience was.

Method

Undergraduate students ($n = 154$; 106 women) completed the study in exchange for partial course credit. The procedure was identical to that of Study 2, with two major differences. First, participants were assigned to one of three conditions: done, more was expected (identical to the more conditions of Studies 2 and 3), and more was unexpected. Participants in the more-was-unexpected condition were informed that they were done with the circle-moving task before the filler study, but afterward they were told that they would actually be completing 50 more trials. Because this information immediately preceded the dependent measures, this information was highly salient when participants rated the remembered aversiveness of the experience. Yet, although these participants had ample time to integrate this information into their ratings (as they were not under any time pressure), they did have less time to prepare themselves for the upcoming experience because the information was revealed only after the filler task. Second, after the primary dependent measures, we asked participants to indicate on the same 9-point scales used previously how irritating and annoying the first task was (i.e., the task used to establish a baseline measure of aversiveness). This allowed us to test whether anticipation of an upcoming experience affected memory for just the focal task or for all aversive tasks. If the anticipation effect occurs because people brace for the anticipated return to the focal task, then this effect should not extend to their memory for the baseline task.

Results and Discussion

We first turn to the remembered aversiveness of the focal task. As can be seen in Figure 2, an ANCOVA on the pooled measure of remembered aversiveness, using the baseline measure of task

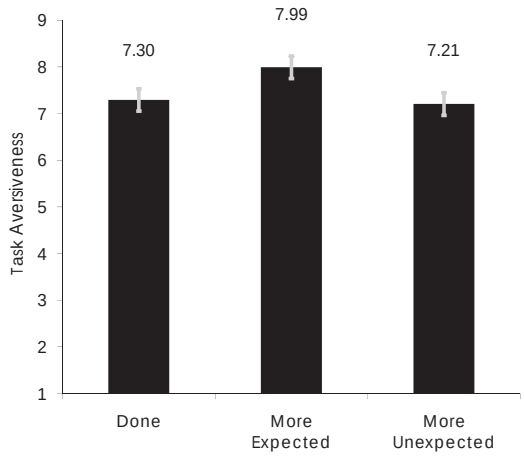

Figure 2. Remembered task aversiveness as a function of expectation of continuation (Study 4). Error bars represent standard errors.

boredom as a covariate, revealed a reliable effect of the anticipation manipulation, $F(2, 150) = 4.76$, $p < .05$. First, we again found that participants in the more-was-expected condition reported greater aversiveness than those in the done condition, $F(1, 150) = 3.71$, $p = .056$. More important, and consistent with the bracing account, when participants did not have the time to brace (more was unexpected), they remembered their past experience as less aversive than those who did have time to brace (more was expected), $F(1, 150) = 9.17$ $p < .005$, and no different from those who did not anticipate returning to the task, $F(1, 150) = 1.25$, *ns*.

We next turn to the remembered aversiveness of the nonfocal (baseline) task. The two measures of aversiveness were highly correlated ($r = .90$, $p < .001$) and were thus pooled into a single measure of aversiveness. Consistent with the argument that bracing for an upcoming experience should affect only the remembered unpleasantness of that same experience, an analysis of variance on the pooled measure did not reveal an effect of the anticipation manipulation (for the done condition, $M = 4.01$; for the more-was-unexpected condition, $M = 4.50$; for the more-was-expected condition, $M = 4.63$), $F(2, 151) = 1.10$, *ns*. Thus, whereas Study 3 demonstrated that memory for the target task is not affected by anticipation of a different task, this result indicates that memory for a different task is not affected by the anticipated return to the target task. This result casts further doubt on a cold-to-hot empathy gap explanation for the anticipation effect. Indeed, according to this account, putting people in a state of high arousal should not only make it easier for them to reimagine the true annoyance of the target task but should also facilitate imagining the true annoyance of the baseline task. Furthermore, whereas the anticipation of a different task in Study 3 may not have been sufficiently vivid to put participants in a hot state, a similar reasoning cannot account for the baseline task results in Study 4, because the anticipation manipulation did affect memory for the target task.

Study 5

The previous study demonstrated that the expected return to an aversive experience did not affect participants' memory for this experience when they did not have sufficient time to brace for its return. Likewise, the present study tests whether the effect of anticipation is similarly reduced when people do not have self-regulatory resources available for bracing. We manipulated participants' self-regulatory resources with a procedure adapted from the ego-depletion literature (Vohs et al., 2008): During the time period that participants could be bracing themselves, we asked participants to complete a series of either easy or difficult choices. We expected that participants who were making the difficult (rather than easy) choices would be more depleted (Baumeister, Bratslvsky, Muraven, & Tice, 1998; Moller, Deci, & Ryan, 2006) and, therefore, would be less likely to have sufficient self-regulatory resources to brace for the upcoming aversive experience. Bracing essentially requires that people force themselves to experience more discomfort right now (by dreading an aversive outcome) in order to reduce their future discomfort (because the future experience would turn out to be less aversive than expected). However, when people are depleted, they may lack the self-regulatory resources to limit future discomfort by inflicting greater distress on themselves right now and thus may not inflate the remembered aversiveness of the experience.

Method

Undergraduate students ($n = 174$; 121 women) completed this study in exchange for partial course credit. The procedure was identical to that of Study 2, with two critical differences. First, similar to Study 4, participants rated not only the remembered aversiveness of the focal task but also that of the initial, nonfocal task. Second, rather than having participants complete a nondemanding filler task between the continuation/completion instructions and the remembered aversiveness ratings, participants instead completed a choice task that was either resource depleting or not. All participants were shown 20 pairs of female faces and asked to indicate, for each pair, which woman was more attractive on a 101-point unmarked slider scale anchored with *the woman on the left is more attractive* and *the woman on the right is more attractive.* Participants in the depletion condition saw 16 pairs of women who were roughly equally attractive and four pairs of women who differed greatly in attractiveness. Participants in the no-depletion condition saw four pairs of women who were equally attractive and 16 pairs of women who differed in attractiveness. Thus, participants in the depletion condition made primarily difficult (i.e., close) choices, whereas those in the no-depletion condition made primarily easy choices. As a manipulation check, after completing all 20 trials, participants indicated how difficult it was to judge which women were more attractive on a 9-point scale (1 = *not at all difficult*, 9 = *very difficult*).

Results and Discussion

First, the manipulation check confirmed that choices in the depletion condition were perceived as more difficult than those in the no-depletion condition (for the depletion condition, $M = 4.49$, for the no-depletion condition, $M = 2.33$), $t(172) = 7.50$, $p < .001$, suggesting that more resources were used in the former condition. Next, a 2 (anticipation: done, more) $\times$ 2 (depletion: depleted, not depleted) ANCOVA on the pooled aversiveness measure, using the baseline measure of task boredom as a covariate, revealed a main effect of the anticipation manipulation, $F(1, 169) = 4.48$, $p < .05$: Participants who expected to return to the aversive task remembered this task as more aversive than those who did not anticipate more of the task (for the more condition, $M = 7.12$; for the done condition, $M = 6.29$). More important, the effect of anticipation depended on the level of depletion, $F(1, 169) = 5.00$, $p < .05$. As can be seen in Figure 3, the anticipation effect was replicated for participants who had not been depleted, $F(1, 169) = 9.41$, $p < .005$, but disappeared when participants lacked the resources to brace for the upcoming experience, $F < 1$. This reliable reduction in the anticipation effect for depleted participants resulted from both a decrease in remembered aversiveness in the more condition (for the more/depletion condition, $M = 6.79$; for the more/no-depletion condition, $M = 7.46$), $F(1, 169) = 2.67$, $p = .10$, and an increase in remembered aversiveness in the done condition (for the done/depletion condition, $M = 6.54$; for the done/no-depletion condition, $M = 6.03$), $F(1, 169) = 2.34$, $p = .13$, although neither of these simple effects reached significance. As in the previous study, we again did not observe an effect of anticipation on the remembered aversiveness of the nonfocal task, consistent with the notion that bracing for an upcoming experience affects only the remembered aversiveness of that same experience

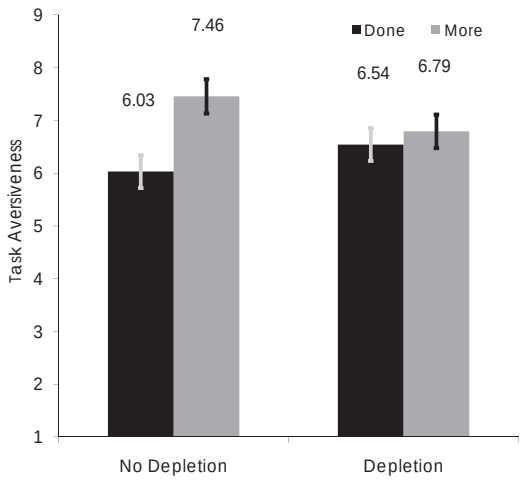

Figure 3. Remembered task aversiveness as a function of expectation of continuation and depletion (Study 5). Error bars represent standard errors.

(for the done/depletion condition, $M = 3.72$; for the done/no-depletion condition, $M = 3.73$; for the more/depletion condition, $M = 4.13$, for the more/no-depletion condition, $M = 3.84$), $F < 1$, *ns*.

Although the results of this study are consistent with a bracing account of the effect, it is possible that the depletion manipulation induced cognitive fatigue, which could have lead to mean reverting estimates (explaining the reduced aversiveness ratings in the more condition). As such, in Studies 6 and 7, we used different paradigms to seek additional, converging evidence of the bracing account.

Study 6

We have argued that the findings presented so far are consistent with a bracing account of the effect of anticipation on remembered aversiveness. Though we acknowledge that the cold-to-hot empathy gap can certainly contribute to the observed anticipation effect, this explanation cannot account for the complete pattern of data observed in our studies. However, there is a third mechanism, related to bracing, that is also consistent with the pattern of results observed thus far. This account is based on previous findings that people experience more intense affect when they imagine future events compared with past events (Caruso, Gilbert, & Wilson, 2008; D'Argembeau & Van der Linden, 2004; Van Boven & Ashworth, 2007). Unlike participants in the done conditions, participants in the more conditions might first anticipate the future before looking back at the past; thus, participants in the more conditions could experience more intense feelings that would contaminate their recalled aversiveness. Thus, both the bracing account and this temporal asymmetry account propose a mechanism that enhances the perceived aversiveness of the anticipated experience and, as a result, increases the remembered aversiveness of the prior exposure to that experience. However, whereas the bracing account proposes that this enhancement results from people's tendency to prepare for the worst, the temporal asymmetry account proposes that it results from people's general tendency to experience future feelings more intensely than past feelings. A key consequence of this distinction is that, whereas bracing is limited to negative experiences, the temporal asymmetry should manifest regardless of the valence of the experience (D'Argembeau & Van der Linden, 2004; Van Boven & Ashworth, 2007): Anticipating the continuation of a pleasant experience should increase remembered enjoyment just as anticipating the continuation of an unpleasant experience increases remembered aversiveness. To test this implication, Study 6 manipulated the valence of the focal task and measured remembered aversiveness of the unpleasant task and remembered enjoyment of the pleasant task. Whereas the bracing account predicts an anticipation effect for the aversive task but not for the enjoyable task, the temporal asymmetry account predicts an anticipation effect for both tasks.[2]

Method

Participants from an online panel ($n = 160$; 121 women; median age = 48) completed the experiment in exchange for entry into a $50 lottery. Approximately half of the participants ($n = 82$) were randomly assigned to the boring task conditions, which followed the exact same procedure as used in Study 2. The remaining participants ($n = 78$) were assigned to the video game conditions, which were designed to be as similar to the boring task conditions as possible, but provided a pleasant experience (a video game) rather than a boring task. Specifically, participants in the video game conditions first played a practice game in which they moved a ball around the screen to collect coins as quickly as possible (to be used as a baseline measure of game playing enjoyment, much like the baseline measure of task aversion in the boring task conditions). They then indicated how fun the task was on a 9-point scale (1 = *not at all fun*, 9 = *extremely fun*). For the next 2 min, participants played the focal game in which they had to use their arrow keys to navigate a ball through a maze as quickly as possible, while making sure not to touch the walls of the maze (which would send them back to the start of the maze). After playing the game, participants were told either that they were done with the game (done condition) or that they would later play the game again for 2 min more (more condition). They then completed a short, unrelated filler task (the same task was used in both the boring task and video game conditions), after which they were reminded that they would either be playing more of the maze game or that they were done with it. They then indicated how enjoyable/entertaining/fun the maze game was on 9-point scales (1 = *not at all enjoyable/entertaining/fun*, 9 = *extremely enjoyable/entertaining/fun*). Finally, they indicated how enjoyable and entertaining the initial coin collecting game was on similar 9-point scales.

Results and Discussion

A 2 (task valence) × 2 (anticipation) ANCOVA on remembered affect with baseline affect as a covariate revealed a main effect of task valence, $F(1, 155) = 111.08$, $p < .001$, such that the aversive task was more aversive than the enjoyable task was enjoyable. More important, it also revealed a two-way interaction, $F(1, 155) = 4.52$, $p < .05$, indicating that the effect of anticipation on

[2] We thank an anonymous reviewer for pointing out this possible alternative explanation and for suggesting this study design.

the intensity of remembered affect was dependent on the valence of the task. As can be seen in Figure 4, participants who anticipated completing more of the aversive task remembered the task as having been more aversive ($M = 6.72$) than those who believed they were done with the task ($M = 5.99$), $F(1, 155) = 4.85$, $p < .05$). In contrast, participants who anticipated completing more of the enjoyable task did not remember the game as more enjoyable ($M = 3.51$) than those who believed they were done with the task ($M = 4.26$), $F < 1$. If anything, participants who anticipated playing the game again remembered enjoying the game slightly less than those who thought they were done with it, a result that runs opposite to what a temporal asymmetry account would predict. Finally, as in the previous studies, the anticipation manipulation did not affect participants' memory for the nonfocal task (unpleasant baseline task: for the done condition, $M = 3.38$; for the more condition, $M = 2.98$; $F < 1$; enjoyable baseline game: for the done condition, $M = 5.31$; for the more condition, $M = 4.73$), $F(1, 78) = 1.08$, *ns*.

These results are consistent with a bracing account of the anticipation effect because bracing should occur only for unpleasant experiences. However, these results are inconsistent with the temporal asymmetry account because this account would predict a general affect-intensifying effect of anticipated experiences, regardless of valence.

Study 7

In the final laboratory experiment, we examined whether participants who showed a stronger reaction to the anticipation manipulation were more likely to engage in bracing behavior in another area as well. Specifically, we replicated Study 2 but included a self-report measure of people's tendency to brace in the context of academic exams. We expected that people who are more likely to brace themselves for exam results should also react more strongly to the anticipated return to the boring task in our experiment (i.e., they should show a stronger increase in the remembered aversiveness of the task).

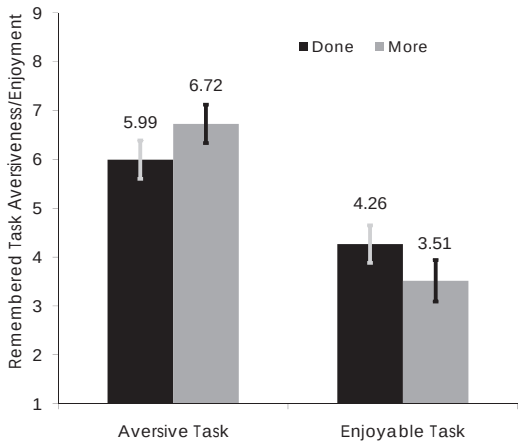

Figure 4. Remembered task aversiveness and enjoyment as a function of expectation of continuation and task valence (Study 6). Error bars represent standard errors.

Method

Participants from an online panel ($n = 51$; 34 women; median age = 22) completed this experiment in exchange for entry into a $50 lottery. The procedure was identical to that of Study 2, with two major differences. First, as in Studies 3 through 6, we also asked participants about remembered aversiveness of the nonfocal task. Second, after answering all primary dependent measures, participants answered the following question: "Imagine that you have just taken a test and you are uncertain about your performance. What would you be more likely to do?" Responses were given on a 9-point scale (−4 = *prepare for the worst and convince yourself that you did poorly*, 4 = *hope for the best and convince yourself that you did well*).

Results and Discussion

Replicating the basic anticipation effect, an ANCOVA on the pooled aversiveness measure, with the baseline measure of task boredom as a covariate, revealed a main effect of the anticipation manipulation. Those participants who expected to return to the boring task remembered this task as more aversive than those who did not expect to return to the task (for the more condition, $M = 7.40$; for the done condition, $M = 6.26$), $F(1, 48) = 5.18$, $p < .05$. We again did not observe an effect of anticipation on the remembered aversiveness of the nonfocal task, confirming that people inflate the aversiveness only of a task that they are about to repeat (for the done condition, $M = 3.85$; for the more condition, $M = 3.93$), $F < 1$, *ns*.

Most important, we computed a correlation between the bracing question and the remembered aversiveness of the focal task. As predicted, in the more condition, responses to these two measures were negatively correlated ($r = -.46$, $p < .05$), suggesting that participants who were more likely to brace in a testing situation were also more likely to brace for the upcoming aversive task in our paradigm. We observed no such correlation for participants in the done condition ($r = -.08$, $p > .6$), indicating that people who tend to brace themselves for bad exams do not simply perceive all experiences as more aversive. Rather, only when an unpleasant experience is expected to return do people who tend to prepare for the worst remember this experience as more aversive than do those who hope for the best.

Study 8

The preceding experiments demonstrated, in controlled settings, that expecting to return to an aversive experience increases the remembered aversiveness of that experience. The present study extends this finding to a naturally occurring aversive experience: menstruation. For many women, menstruation is an aversive and even painful experience (McFarland, Ross, & DeCourville, 1989), and although all women who regularly menstruate probably anticipate their next menstrual period to some degree, it is likely that those whose next period is temporally close anticipate it more than those whose next period is temporally distant. In other words, to the extent that women brace for their upcoming period, they should do so most when it is about to occur. We therefore conducted a field study in which we measured women's remembered aversiveness of their previous period as a function of the time until their

next period. We expected that women would remember their previous period as more painful as they approached their next period.

Method

Women from an online panel ($n = 495$, median age = 29) participated in exchange for entry into a $50 lottery. Of those 495 participants, 315 were menstruating at the time of the survey and were omitted from the analyses.[3] Participants first indicated how many days were left until their next period. Next, they indicated how painful the worst and the average moment of their last period was on two separate 9-point scales (1 = *not at all painful*, 9 = *extremely painful*). They then completed a series of questions designed to be used as covariates in our analysis to control for possible confounding variables. These questions asked about whether they were currently using birth control (0 = *no*, 1 = *yes*), were currently trying to become pregnant (0 = *no*, 1 = *yes*), had any psychological conditions related to menstruation (0 = *no*, 1 = *yes*), had any physiological conditions related to menstruation (0 = *no*, 1 = *yes*), or were currently taking any medication related to their menstruation (0 = *no*, 1 = *yes*). In addition, we measured their self-reported tolerance for pain (1 = *I do not tolerate pain well*, 9 = *I tolerate pain very well*), the average duration (in days) of a typical menstrual period, and their age.

Results and Discussion

The two measures of remembered pain were highly correlated ($r = .86$, $p < .001$) and were therefore pooled into a single measure. To test the hypothesis that women remembered their previous period as more aversive as their next period approached, we submitted this pooled pain measure to an ordinary least squares regression with the number of days until the next period as the critical independent variable. Of interest, we found a curvilinear relationship between time and remembered pain (see Table 1 for regression coefficients and Figure 5 for the data pattern). On the one hand, women who had just experienced their period remembered it as more aversive than those who were in the middle of their cycle. On the other hand—and critical to our hypothesis—women who were approaching their next period also remembered their last period as having been more painful than did those who were in the middle of their cycle. As a result of this U-shaped relationship, women who had just had their period (within the past 3 days) and women who were about to have their next period (within the next 3 days) did not differ in remembered aversiveness of their last period, $F < 1$, but both groups remembered their last period as more painful than did women who were in the middle of their cycle, $F(1, 93) = 4.18$, $p = .04$. The first part of this curvilinear relationship—the initial decrease in remembered aversiveness as more time passed since the last period—is consistent with previous findings that it is harder to imagine the pain once the vivid memory of the painful experience has subsided (e.g., Read & Loewenstein, 1999). However, this effect falls outside the scope of our central research question. We therefore focus on the second part of the curvilinear relationship—the increase in remembered aversiveness as the next period approaches.

Table 1
Field Study: Linear Regression on Remembered Pain

Regressor	Regression coefficient	*t*	*p*
Constant	4.09	3.57	.001
Birth control dummy	−1.00	2.77	.01
Trying to get pregnant dummy	0.45	0.36	*ns*
Psychological conditions dummy	0.04	0.08	*ns*
Physiological conditions dummy	1.00	2.55	.05
Medication dummy	2.26	6.50	.001
Tolerance for pain	−0.05	−0.64	*ns*
Average duration of menstruation	0.32	2.19	.05
Age	−0.03	−1.48	*ns*
Next period (days)	−0.14	−1.89	.06
Next period (days) squared	0.01	1.84	.07

First, we can confirm that there is a negative relationship between time until next period and remembered aversiveness for women who are on the right side of the time range. We started by splitting the sample into two groups on the basis of a median split of the time until next period (*Mdn* = 10 days). Running the regression described earlier on the group of women who were closest to their next period (0–10 days away) revealed a negative linear relationship, $B = -.13$, $t(89) = -1.91$, $p = .06$, and no quadratic relationship, $t < 1$, *ns*, confirming our hypothesis that, as their next period approaches, women remember their previous period as having been more aversive.

Alternatively, we compared the responses of women who were very close to their next menstruation (fewer than 3 days away; consistent with McFarland et al., 1989) and other women. The results of a series of ANCOVAs with all the aforementioned covariates revealed that women whose next period was imminent remembered their past period as more painful ($M = 6.26$) than did other women, regardless of whether they were compared with women who were 3 to 4 days away from their next menstruation ($M = 4.61$), $F(1, 23) = 8.27$, $p < .01$, 3 to 10 days away from their next menstruation ($M = 4.91$), $F(1, 73) = 3.88$, $p = .053$, or all other women ($M = 4.76$), $F(1, 170) = 5.29$, $p < .05$.

This field study replicated the basic finding from the laboratory experiments in a natural context: People remember unpleasant experiences as more aversive when they anticipate returning to that experience. However, given the correlational nature of this study, we can only speculate about the mechanism behind this effect. Although it is possible that bracing for the upcoming period increased the remembered discomfort of the previous period, there are several alternative explanations that can account for the observed relationship. One alternative possibility is that the anticipation of the next period put women in a hot state, which made it easier to recall the discomfort they experienced during their previous period (consistent with the cold-to-hot empathy gap account discussed earlier). Furthermore, it is also possible that women whose period was impending were experiencing psychological or physiological premenstrual symptoms, which influenced the recall of their prior discomfort. In summary, although the correlational nature of this

[3] The disproportionately large number of women in our sample who were currently menstruating was probably caused by the study title on the recruitment advertisement (*Menstruation Study*), even though the advertisement clearly indicated that the only inclusion criterion was that the participant must be regularly menstruating.

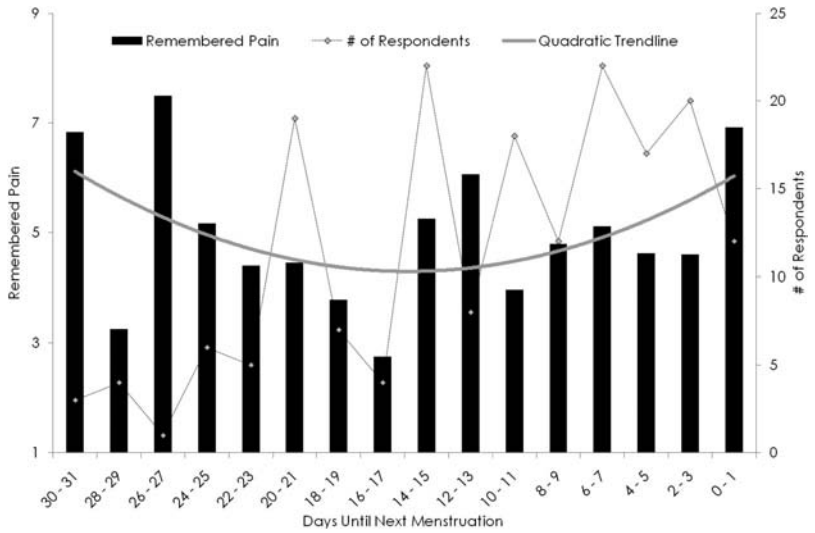

Figure 5. Remembered pain and number of respondents as a function of days until next menstruation (Study 8).

study does not allow us to make strong claims about the underlying process, the finding that women remembered their previous period as more aversive when their next period was imminent provides evidence from the field that is consistent with the effects we have observed in the laboratory. As such, these results attest to the generality of our basic effect.

General Discussion

The results of seven laboratory experiments and a field study demonstrated that people's memory for an aversive experience became more negative when they anticipated returning to that experience. People who had just listened to an irritating noise remembered that experience as more irritating when they expected to listen to more of the noise (Study 1), and people who had completed a boring task remembered that experience as more aversive when they anticipated more trials of the same task (Studies 2–7). Furthermore, women remembered their last menstrual period as more painful as they approached their next period (Study 8).

Our findings are consistent with the notion that the anticipated return to the experience affects people's memory for the experience by activating a strategic bracing mechanism. More specifically, in anticipation of the unpleasant experience, people prepare for the worst and, by raising the anticipated aversiveness of the upcoming experience, they increase the remembered aversiveness of their previous exposure to that experience. Although this bracing response adds to current distress by augmenting the anticipated aversiveness of the upcoming experience, it may improve later well-being by creating a more favorable contrast between actual suffering and expected suffering. Consistent with this bracing account, we observed that the prospect of returning to an unpleasant task affected the remembered aversiveness of that particular task but not the remembered aversiveness of a different aversive task (Studies 3–7) and only if participants had sufficient time (Study 4) and self-regulatory resources (Study 5) to brace themselves for the upcoming experience. Furthermore, the anticipated continuation of a task affected memory for that task only when that task was aversive (and thus something one could brace for) and not when that task was enjoyable (Study 6). Finally, people who reported more bracing in a very different context (i.e., for exam results) tended to remember the experience as more aversive but only when they expected the experience to return (Study 7).

Of course other psychological mechanisms can cause an increase in remembered aversiveness of an experience when one expects to return to it. One such alternative mechanism relies on the phenomenon of the cold-to-hot empathy gap (Loewenstein, 1996). Whereas people may not remember the true aversiveness of an experience when they are in a cold state, the dread of returning to the experience may reactivate a hot state, making it easier to vividly imagine the aversiveness of the experience. Although this is certainly a plausible account that may have contributed to the effects reported in our studies, it does not fully account for the observed effects. First, the empathy gap account cannot explain why the anticipation effect is more pronounced for participants who are more likely to brace in other contexts (Study 7). Moreover, prior research has shown that the cold-to-hot empathy gap can be bridged by putting people in a hot state even when this hot state is caused by a completely different event (Van Boven et al., in press). Yet, we observed that memory for past experiences is affected only by anticipation of the exact same experience (Studies 3–7). Finally, even though the activation of a hot state should occur quickly and automatically (Loewenstein, 1996), we observed that anticipation does not increase remembered aversiveness unless people have sufficient time (Study 4) and self-regulatory resources (Study 5).

Another alternative process by which anticipated repetition can increase remembered aversiveness is through the temporal asymmetry in affect intensity: People experience more intense affect when thinking about the future than when remembering the past (Caruso et al., 2008; D'Argembeau & Van der Linden, 2004; Van Boven & Ashworth, 2007). If anticipating the return of an experience elicits stronger affective reactions than merely looking back at an experience, then the stronger affective reaction to anticipated

aversiveness could also increase remembered aversiveness. However, this effect should hold for both positive and negative experiences (D'Argembeau & Van der Linden, 2004; Van Boven & Ashworth, 2007). Yet, in Study 6, the anticipated return of the experience affected the remembered aversiveness of the tedious task but not the remembered enjoyment of the pleasant game, consistent with a bracing account but not with a temporal asymmetry account. In summary, there are several alternative mechanisms—including those based on the cold-to-hot empathy gap and the temporal asymmetry in affect intensity—that can contribute to the effect of anticipation on affective memory and to the results observed in our studies. However, the complete pattern of results across all studies is most consistent with the view that participants who expected the experience to return remembered it as more aversive because they were bracing for the return.

Questions and Implications

Participants in our studies seemed to prepare for the continuation of the aversive experience by bracing for the worst. However, prior research has indicated that people sometimes engage in strategic optimism instead, as reflected in a tendency to remember an experience as less aversive when they expected to repeat it (Gibbs, 1992). One possible explanation for the discrepancy between our findings and Gibbs's (1992) finding is the difference in the expected duration of the anticipated continuation. If one expects an aversive task to go on for a sufficiently long time (as in Gibbs's 1992 study: drinking 20 more cups of a bitter liquid), being overly pessimistic may not be feasible because the anticipatory aversiveness may seem too daunting. Instead, people may choose to learn to live with the experience by convincing themselves that the experience is not that aversive (i.e., the liquid is not that bitter), thus, bringing their taste in line with their experience. However, when an unpleasant activity is to be repeated only a few times (as in our studies: completing the task one more time), people may instead choose to manage their future distress by lowering their expectations (preparing for the worst) rather than by taking the more substantial step of changing their preferences. More generally, we speculate that people may brace for the worst when the anticipated aversiveness is below a certain threshold but that they may be more likely to engage in strategic optimism instead when the anticipated experience is extremely aversive—because of its intensity, its duration, or the number of repetitions.

The current research also adds a qualification to the substantial number of prior findings that people tend to remember their aversive experiences as less extreme than they actually were (e.g., Mitchell et al., 1997). Whereas this memory bias suggests that people may be tempted to repeat these aversive experiences, our findings indicate that people may second guess these temptations once they actively contemplate repeating the experience—because this contemplation may alter their memories and render them substantially less rosy. Furthermore, our results also allow some recommendations for ways to encourage people to re-engage in aversive experiences that are clearly beneficial, such as specific medical procedures (e.g., painful immunizations, mammograms, and invasive diagnostic tests such as colonoscopies). In light of our research, it may be advisable for medical practitioners to downplay the anticipation of the next procedure (e.g., your next shot) and instead focus on the completion of the first procedure (e.g., the shot you just had). In this way, patients are likely to remember the original experience as having been less aversive and are thus more likely to precommit to an often necessary follow-up.

Furthermore, if expecting to re-engage in an aversive experience indeed counteracts people's tendency to remember past aversive experiences as overly rosy (Mitchell et al., 1997), then bracing for a return may, in fact, lead to more accurate memories. Some additional data we collected as part of Study 8 may shed some light on this issue. In addition to the data from women who were not currently menstruating, we also asked women who were currently menstruating to rate the painfulness of their current period. An ANCOVA on the pain measures for both groups revealed that, relative to the pain reported by women who were currently menstruating ($M = 5.55$), women who were not menstruating remembered their last period as less painful ($M = 4.79$), $F(1, 484) = 12.90$, $p < .001$, suggesting that women tend to misremember their period as less painful than it actually was.[4] However, the recollections of women for whom the next period was impending (i.e., fewer than 3 days away) were not different from the pain ratings of women who were actually menstruating, $F < 1$, suggesting that expecting to return to an unpleasant experience can counteract people's tendency to remember the unpleasant experience as less aversive than it actually was.

We also conducted another test of the effect of anticipation on the accuracy of people's memories by conducting a field study with runners in New York City's Central Park. We asked 161 solo runners how hard it was to run up Harlem Hill (the most difficult part of the running path). Runners were asked about this at one of three locations: before they got to the hill (the more group), when they were two thirds of the way up the hill (the during group), or immediately after they finished the climb (the done group).[5] They were asked to shout out their response to signs stating, depending on location, "How hard will it be to run up Harlem Hill?" (more), "Right now, how hard is it running up Harlem Hill?" (during), or "Just now, how hard was it running up Harlem Hill?" (done). Runners shouted responses on a 5-point scale (1 = *not hard*, 5 = *very hard*). Consistent with an emotion-intensifying effect of anticipation, we found that runners who were about to run up the hill (the more group, $M = 3.39$) thought that it would be more aversive than the runners who had just completed running up the hill (the done group, $M = 2.55$), $F(1, 158) = 14.98$, $p < .001$. More relevant for this discussion, we can assess the accuracy of the more and done groups by comparing their ratings to the ratings of the during group. We found that those anticipating the experience (the more group) gave aversiveness ratings very similar to those of runners who were currently running up the hill (the during group,

[4] It is interesting that these results diverge from some past work on menstruation and remembered pain, which found that women misremembered their last period as more painful than it actually was (McFarland et al., 1989). However, one of the central findings by these researchers was that women's memory for their last period was driven by their lay beliefs about menstruation. Because we did not measure lay beliefs, we cannot infer what the women in our sample believed about menstruation and thus we cannot determine what caused the difference between these two sets of findings.

[5] Because of the time it takes to run the length of the loop in Central Park, no runners responded more than once at any point, making this a between-subjects design.

$M = 3.13$), $F(1, 158) = 1.24$, *ns*. However, those who had completed running up the hill, misremembered the experience as having been less aversive than it actually was, $F(1, 158) = 6.43$, $p < .05$. To the extent that the runners in the more group had prior experience with Harlem Hill and to the extent that they based their expectations on the remembered aversiveness of this prior experience (assumptions that we unfortunately could not verify), these results suggest that, although people's memories tend to offer a rosy view of their past aversive experiences, they may nevertheless remember the true aversiveness of their experiences when they expect to relive them.

On a final note, the sensitivity of people's memories for aversive experiences to the anticipated continuation of those experiences—as demonstrated in these studies—also adds to the understanding of the general malleability of people's memory for their past appraisals. As early as Heider (1958), social psychologists have known that people manipulate their memories. For instance, out of a desire to remain consistent over time, people tend to misremember their previous attitudes as more consistent with their present attitudes than they actually were (Bem & McConnell, 1970). More recently, people misremembered their appraisals of the O. J. Simpson trial as overly consistent with their current appraisals of the trial (Levine, Pohaska, Burgess, Ride, & Laulhere, 2001). The present research adds to this literature by demonstrating another instance in which people strategically alter their memory for their past appraisals—not to create the illusion of consistency but rather to steel themselves against future harm.

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