American Psychological Association

Emotion

1528-3542/18/$12.00

http://dx.doi.org/10.1037/emo0000479

A Better Distraction: Exploring the Benefits of Flow During Uncertain Waiting Periods

Kyla Rankin, Lisa C. Walsh, and Kate Sweeny
University of California, Riverside

A worrisome period of uncertainty frequently precedes important life events, and many of the coping strategies people employ during such waiting periods are ineffective. Distraction can be efficacious, but individuals awaiting uncertain news often fail to lose themselves in a sufficiently diverting activity. Across three studies—two observational and one experimental—we test whether flow-inducing activities provide a better distraction and improve the waiting experience. In Study 1, law graduates ($N = 125$) who experienced more flow while awaiting their bar exam results reported less worry, fewer negative emotions, and more positive emotions. However, they were often unable to accurately identify personally relevant flow-inducing activities. Study 2 replicated these findings in a longitudinal study of doctoral-level students in the academic job market ($N = 141$). Study 3 experimentally tested the effects of engaging in a flow activity (via an adaptive Tetris game) on undergraduate participants ($N = 309$) waiting for peers to rate their physical attractiveness. Study 3 successfully replicated the findings of Studies 1 and 2 with a measure of subjective flow experiences, but the manipulation was only effective for bolstering positive emotion and mitigating negative emotions; it did not reduce worry. Our findings point to challenges in moving people toward flow but suggest that engaging in flow may boost well-being during a period of uncertainty and make waiting a little easier.

Keywords: uncertainty, waiting, flow, well-being, coping

Supplemental materials: http://dx.doi.org/10.1037/emo0000479.supp

A period of uncertainty frequently precedes important life events. Job applicants eagerly await post-interview callbacks, students await their final exam grades, and patients await medical test results. "Will I get the job?" "Will I get the grade I need?" "Will the diagnosis be cancer?" These questions are personally significant and often anxiety-provoking. Answers to such questions require time and patience. Yet individuals vary in their ability to calmly await potentially life-altering news, and not all coping strategies are created equal during these stressful periods of uncertainty. Unfortunately, many of the coping strategies people employ while awaiting uncertain news (e.g., managing expectations, taking preventive action; Sweeny & Cavanaugh, 2012) do not effectively assuage distress and may even backfire (Sweeny, Reynolds, Falkenstein, Andrews, & Dooley, 2016). Thus, the current article presents three studies testing a potentially effective strategy for calmly passing the time while awaiting uncertain news: engaging in flow-inducing activities.

Consider two hypothetical law graduates waiting to hear whether they passed the bar exam. After three long years of law school, they must wait four excruciating months to discover if they have performed well enough on the exam to transition to the next phase of their careers as licensed attorneys. Research indicates that the waiting period for bar exam results is filled with high levels of anxiety, rumination, and pessimism (Sweeny & Andrews, 2014). One of the law graduates, Zack, attempts to relieve the negative psychological experience of waiting by distracting himself with various activities. However, Zack bounces too readily from one distraction to another without fully investing in any particular activity, and thus his efforts fail (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Sweeny, 2012). The other law graduate, Alice, decides to distract herself by selecting a challenging activity that completely captures her attention and induces a state of "flow," or complete absorption and enjoyment (Nakamura & Csikszentmihalyi, 2002). Alice's chosen activity so fully engages her concentration that it shuts out other worries about her impending bar exam result, and thus she experiences greater well-being and more successfully navigates the waiting period than Zack. Our studies seek to test the effectiveness of Alice's strategy.

What Makes Waiting Stressful?

In a recent study, a majority of participants who were asked to recall an uncertain waiting period that ended badly indicated that the waiting was just as difficult or worse than receiving the bad news (Sweeny & Falkenstein, 2015). What makes waiting so stressful? One of the most troubling burdens of uncertainty appears to be worry, a combination of anxiety and future-oriented perse-

Kyla Rankin, Lisa C. Walsh, and Kate Sweeny, Department of Psychology, University of California, Riverside.

Correspondence concerning this article should be addressed to Kyla Rankin, Department of Psychology, University of California, Riverside, CA 92521. E-mail: Krank001@ucr.edu

verative thinking (Poole et al., 1999; Sweeny & Howell, 2017; Sweeny & Falkenstein, 2015; Sweeny et al., 2016). If left to run amuck, worry can confine people who are stuck in waiting limbo to an iterative loop of perpetual, unpleasant thoughts (e.g., "I can't stop thinking about the bar exam," "I keep bringing up the bar exam in conversations with other people"; Howell & Sweeny, 2016; Sweeny & Howell, 2017).

People tend to engage in the most perseverative thinking at the beginning and end of a waiting period, and during these timeframes, people also report the most anxiety and negative emotion and the least positive emotion of the waiting experience (Howell & Sweeny, 2016). Not only do perseverative thoughts feel emotionally aversive, they also appear to be detrimental to human health (Brosschot, Gerin, & Thayer, 2006). Perseverative thoughts have been linked to poor sleep quality and longer sleep onset latency (Querstret & Cropley, 2012; Thomsen, Mehlsen, Christensen, & Zachariae, 2003; Zoccola, Dickerson, & Lam, 2009), and they also interfere with cortisol recovery patterns and increase inflammation (both markers of stress; Zoccola, Figueroa, Rabideau, Woody, & Benencia, 2014). Thus, coping strategies that target the perseverative thoughts that arise while people await uncertain news are likely to be particularly effective for both reducing distress and mitigating consequences of that distress for physical health.

Distraction as a Coping Strategy

Although worry can be useful for motivating people to prevent dire outcomes (e.g., by buckling their seat belt or undergoing medical screenings; see Sweeny & Dooley, 2017), waiting periods often thwart attempts to problem-solve and make it difficult (or even impossible) to alter future outcomes for the better. After all, once the interview is done, the exam completed, or the biopsy sent to the lab for analysis, there is nothing more to do but wait—and worry. Because worrisome, perseverative thoughts are a major culprit in distress during waiting periods, and because waiting periods do not allow for much productive action in response to such thoughts, one's best option is often distraction.

The lay public seems to sense that distraction is a good coping strategy. In an unpublished study, participants in an online survey were asked to reflect on times they had waited for uncertain news and to describe strategies that made the experience easier (Sweeny, 2016). The vast majority of respondents (82%) mentioned that they used some form of distraction (e.g., playing video games, hiking, watching TV or movies, catching up on chores, working) to "keep as busy as possible" or "keep [their] mind off" the waiting.

Distraction aims to alter one's present emotional experience by focusing attention elsewhere, on either external targets (e.g., hobbies, social interactions) or internal targets (e.g., thinking about unrelated, pleasing topics; Sweeny & Cavanaugh, 2012). During a waiting period, distraction is one of the most explicit and direct means of emotion regulation (Gross & Thompson, 2007; Sweeny & Andrews, 2014; Sweeny & Cavanaugh, 2012), and a plethora of research attests to distraction's efficacy in reducing perseverative thoughts and improving mood and coping (Lazarus, 1985; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Nolen-Hoeksema et al., 2008). A recent meta-analysis of 306 studies found that distraction provides an effective way to regulate emotions across numerous situations ($d = 0.27$; Webb, Miles, & Sheeran, 2012).

However, not all distraction techniques are created equal, and even "good" distraction attempts can prove inadequate when it comes to uncertainty (Sweeny et al., 2016). Across several studies, people who report exerting more effort to distract themselves during a waiting period display *higher* levels of worry (Sweeny & Andrews, 2014; Sweeny, Andrews, Nelson, & Robbins, 2015; Sweeny et al., 2016). Efforts to distract oneself also predict poorer self-reported health and greater sleep disruption (Howell & Sweeny, 2016).

Given that distraction should assuage worry by taking the mind away from perseverative thoughts, why do findings in the context of uncertain waiting periods suggest the opposite? One possibility is that the studies just described failed to capture successful distraction attempts. In fact, the measure of distraction used in those studies reflected distraction efforts rather than distraction success ("I've been *trying* to distract myself from thinking about my bar exam results," emphasis added; e.g., Sweeny et al., 2016). Perhaps people are expending a great amount of effort to distract themselves from unwanted thoughts about their uncertainty without successfully achieving that goal. That is, despite their best attempts to "keep their mind off" their distress by engaging in a variety of activities, people are failing to lose themselves in an effective distraction activity. How can people more effectively distract themselves while they wait? We suspect that the answer lies with the experience of flow.

Flow as an Antidote to Uncertainty-Related Distress

The concept of flow emerged from Csizkszentmihalyi's 1960s studies of the creative process, in which he focused particularly on intrinsically motivated, *autotelic* activities ("auto = self, telos = goal"; Nakamura & Csikszentmihalyi, 2002, p. 89). Flow is a state in which one becomes so engaged in a particular activity that the rest of the world falls away and time passes without one noticing; the experience is so intrinsically rewarding that the person partakes in the activity for the pure enjoyment of it—even at great personal cost (Csikszentmihalyi, 1990). As such, the study of flow is the study of optimal experience, or "what a painter feels when the colors on the canvas begin to set up a magnetic tension with each other, and a new thing, a living form, takes shape in front of the astonished creator" (Csikszentmihalyi, 1990, p. 3). The activities that induce flow differ from person to person, but some examples include making music, rock climbing, dancing, sailing, playing chess, swimming, and bicycling (Csikszentmihalyi, 1990).

Achieving flow requires several conditions: the presence of perceived challenges, or opportunities for action, that stretch (without overextending) existing skills, and clear, proximal goals coupled with immediate feedback on one's progress (Nakamura & Csikszentmihalyi, 2002). For example, pianists are more likely to experience flow if they attempt to play concertos slightly more challenging than those they have played before and receive direct feedback on their progress (e.g., hearing a discordant note when hitting a wrong key). Flow requires a delicate and easily disturbed balance. If challenge exceeds skill, one may become anxious; if skills exceed challenge, one becomes bored (Nakamura & Csikszentmihalyi, 2002).

This skill-challenge component has been referred to as the balance hypothesis, proposing that flow experiences will emerge during any activity in which skill level matches the challenge (or

demands) of the task (Keller & Bless, 2008). A wealth of correlational evidence supports the balance hypothesis (for reviews, see Csikszentmihalyi & Rathunde, 1993; Nakamura & Csikszentmihalyi, 2002). More recently, experimental work has provided support for the balance hypothesis by using a widely known computer game: Tetris. For those unfamiliar with the game of Tetris, players must rotate and arrange falling objects (geometric shapes) so that they completely fill rows at the bottom of the screen—akin to putting together virtual jigsaw puzzle pieces. Once a row is completely filled, it disappears. If rows stack up faster than a player can clear them and the objects reach the top of the screen, the game is over.

Keller and Bless (2008) created different versions of Tetris and randomly assigned undergraduate students to play for eight minutes in one of three game conditions: (1) a boredom condition (skill $>$ demand) in which objects fell at a very slow rate, (2) an adaptive condition (skill $=$ demand) in which the speed at which objects fell adapted to the player's performance, and (3) an overload condition (skill $<$ demand) in which objects fell at an extremely fast rate, making it difficult to fill and clear any lines. Participants in the boredom and overload conditions could not change the rate at which objects fell. The researchers found that participants in the adaptive condition reported greater outcomes associated with flow (e.g., they perceived time as passing more quickly and reported higher levels of involvement and enjoyment) than participants in the boredom and overload conditions; they also performed better and rated the activity as a better personal fit. Other studies have replicated and extended these findings using a similar paradigm (Belchior, Marsiske, Sisco, Yam, & Mann, 2012; Keller & Blomann, 2008; Keller, Ringelhan, & Blomann, 2011; Sheldon, Prentice, & Halusic, 2015).

Although the skill-challenge balance is a major contributor to flow, other characteristics (or antecedents) of flow may be particularly beneficial during the periods of uncertainty of interest in our investigation. The experience of flow is also characterized by an intense concentration on the task at hand, the presence of clear goals, receiving unambiguous feedback, a merging of action and awareness, a loss of self-consciousness, a sense of control over one's actions, a feeling that time is passing faster than normal, and an experience of the activity as intrinsically rewarding (Fong, Zaleski, & Leach, 2015; Nakamura & Csikszentmihalyi, 2002). Many of these characteristics have clear implications for stressful waiting experiences. For example, intensely focusing on flow-inducing tasks could help people to reduce their focus on the uncertain future, thus providing a better distraction than engaging in more passive activities like watching TV. Moreover, the sense of control and competence that flow entails may be particularly well-matched to the experience of waiting, which typically involves a loss of control over key aspects of one's future and, in many contexts (e.g., professional, academic, athletic), a sense that one might soon face evidence of personal failure.

Perhaps unsurprisingly, people who experience flow reap gains in pleasure, enjoyment, and fulfillment as a result of those experiences (Lyubomirsky, 2008). Beyond these direct effects, experiencing flow is also associated with greater self-esteem, positive emotion, satisfaction with life, and other measures of psychological well-being, as well as lower negative emotion (Asakawa, 2004; Fritz & Avsec, 2007; Wells, 1988). In an experimental manipulation of flow, undergraduates assigned to engage in a high-flow activity for one hour experienced greater increases in positive affect than those assigned to a low-flow activity for the same amount of time (Rogatko, 2009). Most relevant to the present studies, research has demonstrated a negative association between flow and anxiety (Jackson, Ford, Kimiecik, & Marsh, 1998; Jackson, Martin, & Eklund, 2008).

Taken together, flow experiences appear to be incompatible with anxiety, worry, and negative emotions, and such experiences prompt concentration so intense that reflective self-consciousness melts away and it seems as if nothing else matters—all while providing a surfeit of positive emotions. As such, flow presents a probable candidate to sufficiently distract people from waiting distress. Furthermore, a sense that time is passing faster than normal would likely be a highly desirable side effect when one is stuck in the midst of an uncertain waiting period. Thus, flow may provide an antidote to uncertainty-related distress.

Overview and Hypotheses

The current article presents three studies to test the effectiveness of flow for reducing distress while people await uncertain news. We first assess the relationship between flow and law graduates' worry and positive and negative emotions as they await their bar exam results (Study 1). We then replicate the findings from Study 1 in a second longitudinal study, this time with doctoral-level students seeking a job in the academic job market (Study 2). Finally, we present findings from an in-lab experimental study to determine the effects of engaging in a flow activity (an adaptively challenging Tetris game) on well-being in undergraduates waiting to receive peer ratings of their attractiveness (Study 3).

Our studies had two primary goals. The first goal was to investigate whether experiencing flow more frequently during an uncertain waiting period is associated with reduced levels of worry and negative emotion and heightened levels of positive emotion. Given previous research on the effects of flow, we anticipated that the more people engaged in flow-inducing activities, the less worry and negative emotions and the greater positive emotions they would report. The second goal was to determine whether flow can be manipulated to examine the causal effects of flow and to examine the feasibility of using similar tasks in future interventions for people uncertain about their future.

Study 1

Method

Participants. Law graduates ($N = 125$; 61% female; $M_{age} = 27.74$; 61.1% Caucasian, 18.1% Asian, 6.7% Hispanic/Latino(a), 2.0% African American, 0.7% Native Hawaiian or other Pacific Islander, 11.4% other/multiple) taking the 2016 California bar exam were recruited for a study examining the experience of waiting for bar exam results, a 4-month long wait in California. The majority of the participants (68%) reported passing the bar exam.

Procedure. All participants completed a baseline survey within the month prior to taking the bar exam and the first waiting

survey within three days after completing the bar exam. Due to the duration of the waiting period and to avoid participant burden, participants were then randomly assigned to one of five groups ($n = 25$ per group). Data collection was staggered so that the next three surveys were collected weekly; however, participants only completed surveys once every five weeks while they waited for their bar exam result (e.g., Group 1 completed surveys during weeks 1, 6, and 11; Group 2 completed surveys during weeks 2, 7, and 12). The sixth survey was completed by all participants within 24 hr prior to receiving their bar exam result. Participants also completed two surveys following receipt of their result. Given that the goal of the current article is to examine the role of flow in mitigating distress in the face of acute uncertainty, we focus on responses to the five surveys completed during the waiting period. Participants completed a total of eight surveys and were compensated $10 for each survey they completed; participants could receive up to $80 for completing all eight surveys. All study measures are publicly available on the Open Science Framework (https://osf.io/mpnqt/), and full data are available upon request. All studies presented here were reviewed and approved by the University of California, Riverside Institutional Review Board.

Measures. In each waiting survey, participants responded to measures assessing flow and well-being (worry and emotions) while waiting for their bar exam result.

Dispositional optimism. Dispositional optimism was assessed with the 10-item Life Orientation Test–Revised (Scheier, Carver, & Bridges, 1994; e.g., "In uncertain times, I usually expect the best," "I hardly ever expect things to go my way"; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 4.63$, $SD = 1.14$, Cronbach's alpha = .84). As explained below, we controlled for dispositional optimism in our analyses due to its relationship with both flow and well-being.

Flow. Participants indicated three activities that consistently put them in a state of flow, following a prompt that summarized the experience of flow (adapted from the Flow Questionnaire; Csikszentmihalyi & Csikszentmihalyi, 1988, p. 195).[1] For each of the three activities listed, they reported the frequency with which they engaged in each activity in the previous week ("In the past week, how often have you engaged in [flow activity]?"; 1 = *never,* 5 = *more than once daily*; $M = 2.93$, $SD = .68$). Additionally, we assessed participants' overall flow experience over the past week with 5 items (Csikszentmihalyi, 1990; Layous, Nelson, & Lyubomirsky, 2013; e.g., "I felt very interested in what I was doing," "I felt unaware of myself; I was only aware of the tasks at hand"; 1 = *not at all,* 7 = *very much*; $M = 4.22$, $SD = .80$, $\alpha s > .59$). Although this scale has not been formally validated, previous work using this scale has shown that scores are related to positive emotions, subjective happiness, and presence of meaning (Nelson, Fuller, Choi, & Lyubomirsky, 2014) and can be manipulated via happiness interventions (i.e., best possible selves intervention; Layous et al., 2013).

Worry. Worry was assessed with 3 items ("I feel anxious every time I think about the bar exam," "I am worried about my bar exam result," "I can't seem to stop thinking about the bar exam"; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 4.42$, $SD = 1.24$, $\alpha s > .77$).

Emotions. We assessed emotional states experienced over the past week with 9 items (adapted version of the Affect-Adjective Scale; Diener & Emmons, 1984). Negative emotions were measured with four items ("angry/hostile, frustrated, depressed/blue, unhappy"; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 3.84$, $SD = 1.20$, $\alpha s > .84$), and positive emotions were measured with four items (happy, pleased, joyful, enjoyment/fun; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 5.36$, $SD = .90$, $\alpha s > .85$).

Results

Flow activities. The most frequent flow activities listed by participants were reading (14.5%), watching TV or movies (7.7%), and exercising (5.8%). Although participants listed a wide range of activities, we noted that the two most commonly listed activities (reading and watching TV/movies) are inconsistent with the key characteristics of flow—namely challenge and feedback. Although people sometimes report experiencing flow while engaging in activities such as reading if they find it challenging and goal-oriented (Csikszentmihalyi, 1990), many people approach these activities in a more passive way. It may be that our prompt failed to effectively direct participants to generate true flow-inducing activities; thus, the remainder of our analyses focus on the 5-item subjective measure of flow experiences.

Flow and well-being. Given the longitudinal nature of our data, we used multilevel modeling to examine the relationship between flow experiences and well-being across the waiting period, nesting repeated measurement points (Level 1) within individuals (Level 2). All analyses were conducted with the SAS 9.4 PROC MIXED procedure. We first used longitudinal growth curve modeling to test for linear or quadratic trends in flow experiences across the waiting period. In fact, a quadratic growth model fit best, $\triangle\chi^2 = 10.4$, $p < .01$ (compared to a linear growth model), and the fixed effect of quadratic time was significant, $t = -2.20$, $p = .03$; the linear fixed effect was not significant, $t = -1.21$, $p = .23$. The negative quadratic trend suggests that participants experienced the least flow at the points in the waiting period when distress tends to be highest, namely the start (shortly after the bar exam) and end (shortly before receipt of results) of the wait (e.g., Sweeny & Andrews, 2014; Sweeny et al., 2016).

Given the similarity in time trends between flow and well-being in this context, we controlled for both linear and quadratic time in all subsequent analyses to minimize the confounding impact of time on any observed relationships. Specifically, we created multilevel models predicting well-being (worry, negative emotion, positive emotion) from person- and grand-mean centered flow, controlling for linear and quadratic time and their interactions with person- and grand-mean centered flow and controlling for baseline (pre-exam) levels of the dependent variable. We also noted a consistent relationship between dispositional optimism (a trait-like tendency to expect positive outcomes (Carver, Scheier, & Segerstrom, 2010) and flow, $r = .21$, $p = .02$, across the waiting surveys, so we controlled for dispositional optimism in all mod-

[1] "My mind isn't wandering. I am not thinking of something else. I am totally involved in what I am doing. My body feels good. I don't seem to hear anything. The world seems to be cut off from me. I am less aware of myself and my problems. My concentration is like breathing; I never think of it. When I start, I really do shut out the world. I am really quite oblivious to my surroundings after I really get going. I think that the phone could ring, and the doorbell could ring or the house burn down or something like that. When I start I really do shut out the world. Once I stop I can let it back in again. I am so involved in what I am doing. I don't see myself as separate from what I am doing."

els.[2] Table 1 presents key model parameters, and full model information is available in the online supplemental materials.

Between-person flow negatively predicted worry, such that people who generally experienced more flow throughout the waiting period also reported lower levels of worry overall. The within-person effect of flow on worry was not significant. Between-person flow also negatively predicted negative emotion (marginally), as did within-person flow (significantly). The latter effect suggests that during points in the waiting period when people experienced particularly high levels of flow, relative to their typical level, they also reported lower levels of negative emotion. Similarly, both between- and within-person flow significantly predicted greater positive emotion. That is, participants who generally experienced more flow also reported higher levels of positive emotion overall, and participants reported the most positive emotion at times when they also reported the most flow.[3]

Study 2

As expected, results from Study 1 suggest that experiencing flow while waiting is associated with greater well-being (less worry and negative emotion and greater positive emotion). Exploratory analyses revealed that people experienced flow most often in the middle of the waiting period and less so at the start and end, when waiting is most challenging (Sweeny & Andrews, 2014; Sweeny et al., 2016). The aim of Study 2 was to replicate and extend the findings from Study 1 in a different significant professional waiting period: doctoral-level students awaiting news from job applications while on the academic job market.

Method

Participants. Doctoral-level students across a diverse set of fields ($N = 141$; 59% female; $M_{age} = 30.14$; 74.5% Caucasian, 10.6% Asian, 5.7% Hispanic/Latino(a), 2.1% African American, 1.4 Native American, 5.7% other/multiple) in the academic job market (i.e., seeking employment in academic or related sectors) were recruited at the start of the 2016–17 academic year for a longitudinal study of their experience in the job market. Participants completed a set of monthly surveys as well as three 5-day bursts of ecological momentary assessments (i.e., brief measures multiple times a day). Participants who completed all aspects of the study received $80 in Amazon.com gift cards.

Table 1
Results From Multilevel Models Predicting Well-Being From Flow (Studies 1 and 2)

	Study 1		Study 2	
Well-being	*b* (*se*)	*t*	*b* (*se*)	*t*
Worry				
Within-person	−.02 (.07)	.28	−.14 (.07)	−1.99*
Between-persons	−.30 (.15)	−1.97*	.14 (.17)	.85
Negative emotion				
Within-person	−.23 (.11)	−2.07*	−.32 (.09)	−3.49**
Between-persons	−.24 (.14)	−1.74+	−.13 (.18)	−.70
Positive emotion				
Within-person	.31 (.08)	3.92**	.41 (.08)	5.38**
Between-persons	.22 (.10)	2.16*	.65 (.13)	5.10**

Note. All analyses controlled for dispositional optimism; Study 1 analyses also controlled for baseline (pre-exam) levels of the relevant dependent variable.
+ $p < .10$. * $p < .05$. ** $p < .01$.

Procedure. Participants completed a survey each month between October and April. At the start of each survey, participants indicated whether they had secured a position since completing the previous survey. For the purpose of our analyses, we include responses from participants who had not yet secured a position and thus were still enduring a period of uncertainty. That is, participants "drop out" of the analyses at the point they accept a job. The measures described here are part of a larger data set; all study measures are publicly available on the Open Science Framework (http://osf.io/h6ym5). The study was reviewed and approved by the University of California, Riverside Institutional Review Board.

Measures. In each survey, participants responded to measures assessing flow and well-being (worry and emotions).

Dispositional optimism. Given the association between dispositional optimism and key variables in Study 1, we again include it as a covariate in Study 2, using the same measure as described in Study 1 ($M = 4.65$, $SD = 1.11$, $\alpha = .84$).

Flow. In each survey, participants completed the same 5-item measure of flow as described in Study 1 ($M = 4.28$, $SD = .85$, αs $> .67$).

Worry. Worry was again assessed with 3 items ("I feel anxious every time I think about the job market," "I am worried about my prospects on the job market," "I can't seem to stop thinking about the job market"; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 4.69$, $SD = 1.10$; αs $> .69$).

Emotions. We assessed emotional states experienced over the past week with the same measure described in Study 1 (negative emotions: $M = 3.47$, $SD = 1.30$; αs $> .82$; positive emotions: $M = 4.73$, $SD = 1.13$; αs $> .87$).

Results

We once again used multilevel modeling with SAS 9.4 PROC MIXED to examine the relationship between flow experiences and well-being across the time participants were waiting for news about their job applications, nesting repeated measurement points (Level 1) within individuals (Level 2). We first used longitudinal growth curve modeling to test for linear or quadratic trends in flow experiences across the waiting period. As in Study 1, a quadratic growth model fit best, $\triangle\chi^2 = 23.2$ $p < .01$ (compared to a linear growth model), and the fixed effect of quadratic time was significant, $t = 2.52$, $p = .01$; the linear fixed effect was not significant, $t = 0.30$, $p = .76$. In contrast to Study 1, however, the positive quadratic trend suggests that participants experienced the *most* flow at the start and end of the waiting period—which is sensible in this context, given that the job market was not yet in full swing at the start of the study, and participants likely knew they were close to securing a position at the last point their survey data were included in our analyses.

[2] Other available individual difference measures included defensive pessimism (correlation with overall flow: $r = -.02$, $p = .78$), intolerance of uncertainty ($r = -.01$, $p = .88$), Big Five personality traits (rs $< .09$, ps $> .20$), attachment style (rs $< .19$, ps $> .06$), and trait mindfulness ($r = .18$, $p = .07$).

[3] The pattern of findings was identical when dispositional optimism was removed from the models.

To test links between flow and well-being, we created multilevel models predicting well-being (worry, negative emotion, positive emotion) from person- and grand-mean centered flow, controlling for linear and quadratic time, their interactions with person- and grand-mean centered flow, and dispositional optimism. Table 1 presents key model parameters, and full model information is available in the online supplemental materials.

Within-person flow negatively predicted worry, such that people reported less worry at times when they also reported experiencing more frequent flow states. The between-person effect of flow on worry was not significant. Within-person flow also negatively predicted negative emotion, such that people reported less negative emotion at times when they also reported more frequent flow states; the between-person effect was not significant. Both between- and within-person flow significantly predicted greater positive emotion. That is, participants who generally experienced more flow also reported higher levels of positive emotion overall, and participants reported the most positive emotion at times when they also reported the most flow.[4]

Study 3

Consistent with our hypotheses, results from Studies 1 and 2 provide converging evidence that experiencing flow while waiting is associated with greater well-being (less worry and negative emotions and greater positive emotions). Results from both studies further suggest that people experience flow less often when uncertainty is most intense (in Study 1, shortly after the exam and at the moment of truth; in Study 2, during the most "eventful" months of the job market).

Although the real-world, highly consequential waiting periods were a strength of Studies 1 and 2 for external validity, the observational and correlational designs did not allow us to determine whether flow was causally related to well-being. Flow may promote a better emotional state, as we have proposed. On the other hand, a pleasant emotional state might promote experiences of flow, or perhaps the relationship between flow and one's emotional state is bidirectional. Thus, the primary goal of Study 3 was to replicate and extend the findings from Studies 1 and 2 using an in-lab experimental design that would allow us to determine whether flow can be successfully manipulated during a stressful waiting period and to establish a causal relationship between flow and a positive emotional state. As a secondary goal, we also examined whether flow would be particularly beneficial in the face of imminent feedback. The temporal pattern observed in Studies 1 and 2 suggests that flow may be hard to come by when waiting is most challenging, yet it may also be most useful in those moments. To this end, we manipulated whether participants expected to resolve their uncertainty during the study session. Considerable evidence suggests that people find waiting to be more stressful when news is imminent, which prompts a cascade of anxiety and worst-case scenario thinking (e.g., Shepperd, Grace, Cole, & Klein, 2005; Sweeny & Krizan, 2013). We tentatively hypothesized that participants for whom news was imminent would benefit more from the flow manipulation.

To these ends, we adapted a flow manipulation from previous studies, as described earlier—a Tetris-like game played at varying levels of difficulty. This game, used successfully as a flow manipulation in previous studies (Keller & Bless, 2008; Keller & Blomann, 2008), creates the conditions necessary for promoting a state of flow (i.e., skill-demand compatibility, involvement, enjoyment) while also providing options to create nonflow states (i.e., boredom and excessive challenge). Therefore, we used this validated method in our study to manipulate flow.

Method

Participants. Psychology undergraduate students ($N = 309$; 68% female; $M_{age} = 19.57$; 38.8% Hispanic/Latino(a), 34.6% Asian, 10.7% Caucasian, 3.6% Native American or Alaskan, 3.2% African American, 0.3% Native Hawaiian or other Pacific Islander, 8.8% other/multiple) participated in this study for course credit. A total of 19 participants were excluded from the data set due to not playing the game on the assigned level (either due to a software glitch or not following instructions), as determined by a final check by the researchers once game play was complete.

Procedure. When participants entered the lab, they were informed that the study would examine the nature of physical attraction. After participants consented, they completed a baseline questionnaire. Then the research assistant announced that s/he needed to take a digital photo of the participant so that other students participating in the study at different locations across campus could rate the participant's physical attractiveness. While the photo was ostensibly uploaded onto a computer, participants rated five photographs of people they believed to be other participants in the study.[5] Participants were then randomly assigned to one of six conditions in a 2×3 experimental design. Half of the participants were told they would receive feedback on their attractiveness ratings at the end of the session (*feedback* condition; $n = 158$), and the other half of the participants were led to believe they would not receive their photo attractiveness ratings (*no feedback* condition; $n = 161$). Participants then played a Tetris game on the computer (programmed prior to participants entering the lab), which they played for 10 min on either a low challenge level (*boredom condition*; $n = 110$), an adaptive level that increased in difficulty as participants made successful moves (*flow condition*; $n = 114$), or a high challenge level (*overload condition*; $n = 95$).[6] Participants in the feedback condition played the game while they awaited their attractiveness ratings.

Once participants had played the Tetris game for 10 min, they completed a final survey, which measured flow, worry, and emotions. Following completion of this survey, the research assistant disclosed the true nature of the study and obtained permission to use the participant's data.

Measures. Participants responded to baseline measures assessing dispositional optimism and emotions. Following the flow manipulation, participants responded to measures assessing flow experiences and well-being (worry and emotions).

[4] The pattern of findings was identical when dispositional optimism was removed from the models, except that the between-person effect of flow on negative emotion became significant.

[5] Versions of this lab paradigm have successfully created an experience of stressful uncertainty in numerous published studies, as evidenced by behavior consistent with this experience (e.g., bracing for the worst, avoiding information; see Cavanaugh & Sweeny, 2012, Study 1; Sweeny & Falkenstein, 2017, Studies 4, 8, and 9; Sweeny & Miller, 2012, Study 2; Howell, Sweeny, Miller, & Shepperd, 2017).

[6] The levels for each condition were determined based on responses in a pilot test, in which participants completed several levels of the game and responded to the 10-item flow scale.

Dispositional optimism. Dispositional optimism was assessed with the 10-item Life Orientation Test–Revised (Scheier, Carver, & Bridges, 1994; e.g., "In uncertain times, I usually expect the best," "I hardly ever expect things to go my way"; 1 = *strongly disagree,* 5 = *strongly agree*; $M = 3.29$, $SD = .61$, Cronbach's alpha = .74).

Baseline emotions. We assessed baseline emotional states with 17 items (adapted version of the Affect-Adjective Scale; Diener & Emmons, 1984). Negative emotions were assessed with 8 items (e.g., frustrated, angry/hostile, bored; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 2.21$, $SD = .93$, $\alpha = .82$), and positive emotions were assessed with 9 items (e.g., happy, pleased, joyful; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 3.90$, $SD = 1.18$, $\alpha = .93$).

Flow. Flow was assessed with the 10-item flow short scale (Rheinberg, Vollmeyer, & Engeser, 2003; e.g., "I just felt the right amount of challenge," "I did not notice the time passing," "I was totally absorbed in what I am doing") and an additional 3 items to assess autotelic experience ("I enjoyed the experience," "I found the experience extremely rewarding," "I felt great while performing the activity"; 1 = *not at all,* 7 = *very much*; for all 13 items, $M = 4.48$, $SD = 1.01$, $\alpha = .83$). We included these additional items to capture a component of flow introduced in Csikszentmihalyi's later work (Nakamura & Csikszentmihalyi, 2002) and thus not assessed in the original 10-item flow short scale, which only captures fluency of performance and absorption in an activity. We present analyses with and without these additional items.

Worry. Worry was assessed with 4 items ("I feel anxious every time I think about my photo rating," "I am worried about my photo rating," "I can't seem to stop thinking about how people rated my photo," "I am distracted by thoughts about my rating"; 1 = *strongly disagree,* 7 = *strongly agree; M* = 3.53, *SD* = 1.66, $\alpha = .89$). Worry was not assessed at baseline because they were specific to the situation (e.g., "I am worried about my photo rating"), and participants had received only a brief overview of study procedures at this point. In other words, they did not yet know what to worry about.

Emotions. We again assessed emotional state following game play. Negative emotions were assessed with 8 negative emotion items (e.g., frustrated, angry/hostile, bored; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 1.87$, $SD = .74$, $\alpha = .78$), and positive emotions were assessed with 9 positive emotion items (e.g., happy, pleased, joyful; 1 = *strongly disagree,* 7 = *strongly agree*; $M = 3.92$, $SD = 1.27$, $\alpha = .94$).

Results

Manipulation check. We first ran a manipulation check to determine if the conditions influenced participants' subjective experience of flow in the intended pattern. We first conducted a 2 × 3 ANOVA that examined the effects of feedback (*feedback* vs. *no feedback*), game level (*boredom* vs. *flow* vs. *overload*), and their interaction on self-reported flow. There was a main effect of game level on flow, with participants in the flow condition experiencing greater flow compared to the boredom condition, $F(1, 306) = 12.15$, $p < .001$, and overload condition, $F(1, 306) = 25.90$, $p < .001$, which did not differ significantly from each other, $F(1, 306) = 2.97$, $p = .09$. Neither the main effect of feedback nor the interaction term were statistically significant (see Table 2 for full results and Table 3 for descriptive statistics by condition).[7]

Effects of the flow manipulation. Table 2 presents the results of analyses examining the effects of our manipulations on well-being. We first conducted a 2 × 3 ANOVA that examined the effects of feedback (*feedback* vs. *no feedback*), game level (*boredom* vs. *flow* vs. *overload*), and their interaction on worry, controlling for baseline negative emotions.[8] Neither main effect nor their interaction was significant. We then conducted similar 2 × 3 ANOVAs for negative and positive emotion, controlling for baseline emotion (negative and positive emotion, respectively). For negative emotion, we found a main effect of game level; neither the main effect of feedback nor the interaction term were significant. We ran simple effects tests on the estimated marginal means (controlling for baseline measures) of negative emotions to inspect the main effect of game level. Participants in the flow condition experienced less negative emotion following game play than did participants in the boredom condition, $F(1, 312) = 4.50$, $p = .03$, and the overload condition, $F(1, 312) = 13.89$, $p = .0002$. The overload and boredom conditions did not differ significantly from each other, $F(1, 312) = 2.79$, $p = .10$.

Similarly, we found a main effect of game level on positive emotion, and again neither the main effect of feedback nor the interaction term was significant (see Table 2). Simple effects tests using estimated marginal means of positive emotions following game play revealed that participants in the flow condition experienced greater positive emotion compared to those in the boredom condition, $F(1, 312) = 4.27$, $p = .04$, and the overload condition, $F(1, 312) = 7.77$, $p = .006$. The overload and boredom conditions did not differ from each other, $F(1, 312) = 0.63$, $p = .43$.

Predicting well-being from subjective reports of flow. We also examined associations between participants' subjective reports of flow during game play and their well-being. In all of the following analyses we controlled for dispositional optimism, as it was significantly correlated with flow, $r(309) = .15$, $p = .01$. Controlling for baseline negative emotion, flow negatively predicted worry, $\beta = -.12$ [−.23, −.01], $p = .03$, and negative emotion, $\beta = -.26$ [−.34, −.19], $p < .001$. Controlling for baseline positive emotion, flow positively predicted positive emotions, $\beta = .33$ [.27, .38], $p < .001$.[9,10]

[7] When excluding the three autotelic experience items (using only the 10-item flow scale), subjective flow experience was highest in the flow condition compared to the boredom condition, $F(1, 313) = 8.02$, $p = .004$, and overload condition, $F(1, 313) = 30.85$, $p < .001$. The boredom and overload condition differed from each other, $F(1, 312) = 7.89$, $p = .01$, with those in the boredom condition experiencing greater subjective flow.

[8] Baseline negative emotions and worry were positively correlated, $r(319) = .25$, $p < .0001$.

[9] The pattern of findings were identical when only using the 10-item flow short scale and excluding the three autotelic experience items. Flow predicted less worry, $\beta = -.13$ [−.24, .03], $p = .02$, and negative emotion, $\beta = -.23$ [−.31, −.16], $p < .0001$, and greater positive emotion, $\beta = .26$ [.20, .32], $p < .0001$.

[10] Flow continues to be a significant predictor (if not stronger) of all well-being outcomes when not controlling for dispositional optimism or baseline emotion.

Table 2
Effects of Game Level, Feedback, and Their Interaction on Well-Being (Study 3)

	Main effect of game level		Main effect of feedback		Interaction	
Well-being	$F(2, 303)$	η^2	$F(1, 303)$	η^2	$F(2, 303)$	η^2
Flow	13.71^{**}	.079	2.10	.006	2.96^{+}	.017
Worry	.27	.002	3.29^{+}	.009	1.67	.009
Negative emotion	7.04^{**}	.022	.20	<.001	.46	.001
Positive emotion	4.29^{**}	.009	.01	<.001	.01	<.001

Note. Results from 2 × 3 ANOVAs. Analyses with worry and negative emotion control for baseline negative emotion; analyses with positive emotion control for baseline positive emotion.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$.

General Discussion

Across three studies of people's experiences during a stressful waiting period—two observational and one experimental—we examined how flow is related to well-being. The results of Study 1 indicated that people who experienced greater flow while waiting for their bar exam result were less worried and had an overall more positive emotional experience during the wait, even after controlling for how people were feeling while studying for the bar exam. Additionally, at times when people reported the most frequent flow experiences, they also reported the lowest negative emotions and highest positive emotions. Study 2 revealed a very similar pattern of effects in a sample of doctoral-level students in the academic job market, such that students who experienced greater flow while awaiting news from their job applications had a more positive emotional experience, and they felt better and worried less at times when they reported the most frequent flow experiences.

The results from Study 3 replicated the findings from Studies 1 and 2 when it came to subjective reports of flow experiences. Subjective experiences of flow were again associated with greater positive emotions and lower negative emotions (including worry), even after controlling for baseline levels of emotion upon participants' arrival at the lab for their study session. However, the effectiveness of our flow manipulation was less clear. In line with previous experiments using the Tetris paradigm to induce flow (Keller & Bless, 2008; Keller & Blomann, 2008), our manipulation was successful in producing subjective experiences of flow—yet it was only effective for bolstering positive emotion and buffering negative emotion. As in previous correlational research (Jackson et al., 1998; Jackson et al., 2008), we found that flow negatively predicted worry, but our manipulation did not directly reduce worry related to participants' attractiveness ratings. Thus, the relationship between flow and one's emotional state may be bidirectional, but our findings suggest that the relationship is not unidirectional from emotional state to flow.

The Complex Dynamics of Flow During Waiting Periods

The results from our studies suggest that, as anticipated, flow experiences may improve the otherwise emotionally unpleasant experience of awaiting uncertain news. Across all three studies, subjective experiences of flow predicted more positive emotions and less negative emotions and worry. This finding held true even after controlling for a dispositional trait that captures general positivity (dispositional optimism) and the emotions people reported prior to the start of the waiting period, mitigating the viability of third-variable explanations. Furthermore, the within-person effects in Studies 1 and 2 speak to the dose–response nature of flow in these stressful moments. That is, although we cannot draw causal conclusions from correlational studies, the pattern of data is consistent with the possibility that finding more frequent moments of flow in a given period of time reduces negative emotions and bolsters positive emotions during that period. In short, flow seems to be good for people who are waiting for personally consequential news.

We also identified a reliable pattern in flow over the course of Studies 1 and 2, such that people experienced less flow at points in the waiting period when they report poorer well-being (at the start and end of the wait in Study 1 and during the middle of Study 2). The beginning and end of a structured waiting period like the one in Study 1 are marked by particularly high levels of worry,

Table 3
Descriptive Statistics by Condition (Study 3)

	Feedback		Game level		
Well-being	Feedback (n = 153) M (SD)	No Feedback (n = 156) M (SD)	Flow (n = 109) M (SD)	Boredom (n = 107) M (SD)	Overload (n = 93) M (SD)
Flow	4.41 (1.03)	4.55 (1.00)	4.83 (.95)	4.39 (.93)	4.16 (1.04)
Worry	3.65 (1.63)	3.40 (1.69)	3.45 (1.72)	3.45 (1.67)	3.48 (1.58)
Negative emotion	−.32 (.68)	−.39 (.67)	−.48 (.69)	−.38 (.73)	−.17 (.55)
Positive emotion	.01 (.76)	.01 (.72)	.17 (.78)	−.01 (.65)	−.15 (.77)

Note. For emotions, means and SDs represent difference scores from pre- to post-game play, given significant differences between conditions at the outset of the study. Flow and worry were assessed only following game play.

negative emotions, and attendant efforts to cope (Sweeny & Andrews, 2014; Sweeny et al., 2016). Perseverative thoughts are also most intrusive during those times, and we suspect that it is difficult to achieve a flow state when one's mind is fixated on thoughts of the uncertain future—further substantiating the possibility of a bidirectional relationship between flow and well-being. In contrast, the journey on which doctoral-level students embark when entering the job market is far less structured compared to the waiting period law graduates endure following the bar exam. The academic job market does not have a set start point or duration, and the end of the wait (i.e., a desirable job offer) may be a protracted experience of negotiations and decision making. Thus, the most stressful period during a year on the academic job market is likely in the middle, once students have submitted their applications and interviews have commenced.

When our findings are taken together, a picture of flow's role in waiting experiences begins to emerge: Flow states are difficult to achieve during the most challenging moments of uncertainty (Studies 1 and 2), but they confer benefits for well-being once achieved (Study 3). Thus, our findings go beyond well-established links between flow and well-being in daily life to reveal complex dynamics characteristic of waiting periods.

Unanswered Questions and Future Directions

Our investigation had several strengths. We replicated our findings across two domains (professional outcome vs. social evaluation), compared results from field (observational) and lab (experimental) studies, and used different situation-relevant scales to measure subjective flow experiences. Additionally, ours are some of the first studies to test the effectiveness of an intentional strategy for reducing distress while waiting for uncertain news. Another strategy shown to mitigate distress while waiting is mindfulness meditation (Sweeny & Howell, 2017); however, meditation is not appealing to everyone. In contrast, the activities that produce flow states are as varied as the people who engage in them, which allows people to pursue this strategy for coping with uncertainty in a way that they find convenient and enjoyable.

Despite these strengths, several unanswered questions remain. First, our findings merit replication in different populations and domains. For example, a common and particularly distressing waiting period is the wait for medical test results. Perhaps the most conservative test of the power of flow to bolster well-being would be in life-and-death circumstances like the wait for biopsy results. Second, although we were successful in manipulating the subjective state of flow and the flow manipulation affected a broad set of emotions in Study 3, worry was left largely untouched. Perhaps worry is more intractable than other emotions during waiting periods, given the centrality of anxiety and negative thoughts to moments of acute uncertainty (e.g., Sweeny, in press), or perhaps future research can identify flow activities that are effective for tempering all flavors of distress. Furthermore, our attempt to prompt people to identify personally relevant flow activities in Study 1 was largely unsuccessful, suggesting that people may have difficulty recognizing which activities put them in a state of flow (or perhaps even understanding the concept of flow as explained by verbose psychology researchers). Thus, although experiencing flow during waiting periods is good, it may prove difficult to develop effective interventions to induce flow in these moments. In order to do so, a strong manipulation—either an activity that reliably produces strong flow states in most people or a prompt that helps people correctly identify flow activities in their own lives—needs to be developed. Considering the heterogeneity of the activities participants listed in Study 1, the latter option may be more successful. People listed activities that were physical (e.g., sports), creative (e.g., completing a puzzle), and professional (e.g., mock trials), suggesting that personal preferences may render one-size-fits-all interventions relatively ineffective.

More concerning, participants listed activities that Csikszentmihalyi, the "father" of flow, called into question as flow-inducing (i.e., watching TV, reading; Csikszentmihalyi, 1990). Although it is possible to achieve flow while engaging in these types of activities, the conditions that induce flow (appropriately challenging, clear markers of progress) are difficult to meet when engaging in a passive activity such as reading news online or watching TV. Developing a method to help people successfully identify activities that will produce the subjective experience of flow and testing the most effective ways to induce flow are important avenues for future research. Additionally, it would be beneficial to this line of inquiry to determine how often people should engage in such activities and how to best implement a flow intervention (e.g., in-person training, daily reminders, self-directed activities).

Conclusion

Assessing and inducing flow states is a novel approach to the question of how to make waiting a little easier, a question that has few easy answers (Sweeny et al., 2016; cf. Sweeny & Howell, 2017). Our findings suggest that a state of flow is good for well-being during stressful waiting periods, but our findings also point to challenges in moving people toward flow, particularly when waiting is most worrisome. Flow many not be a panacea for eliminating distress in the face of uncertainty; nonetheless, we suggest that when uncertainty looms largest in one's mind, finding flow may bolster well-being and make the time pass a little faster.

References

Asakawa, K. (2004). Flow experience and autotelic personality in Japanese college students: How do they experience challenges in daily life? *Journal of Happiness Studies, 5,* 123–154. http://dx.doi.org/10.1023/B:JOHS.0000035915.97836.89

Belchior, P., Marsiske, M., Sisco, S., Yam, A., & Mann, W. (2012). Older adults' engagement with a video game training program. *Activities, Adaptation & Aging, 36,* 269–279. http://dx.doi.org/10.1080/01924788.2012.702307

Brosschot, J. F., Gerin, W., & Thayer, J. F. (2006). The perseverative cognition hypothesis: A review of worry, prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research, 60,* 113–124. http://dx.doi.org/10.1016/j.jpsychores.2005.06.074

Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review, 30,* 879–889. http://dx.doi.org/10.1016/j.cpr.2010.01.006

Cavanaugh, A. G., & Sweeny, K. M. (2012). Hanging in the balance: The role of self-construal abstractness in navigating self-relevant uncertainty. *Personality and Social Psychology Bulletin, 38,* 520–527. http://dx.doi.org/10.1177/0146167211429806

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper Perennial.

Csikszentmihalyi, M., & Csikszentmihalyi, I. (1988). *Optimal experience: Psychological studies of flow in consciousness*. Cambridge, England: Cambridge University Press.

Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. In J. J. Jacobs (Ed.), *Nebraska symposium on motivation: Vol. 40. Developmental perspectives on motivation* (pp. 57–97). Lincoln, NE: University of Nebraska Press.

Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology, 47,* 1105–1117. http://dx.doi.org/10.1037/0022-3514.47.5.1105

Fong, C. J., Zaleski, D. J., & Leach, J. K. (2015). The challenge–skill balance and antecedents of flow: A meta-analytic investigation. *The Journal of Positive Psychology, 10,* 425–446. http://dx.doi.org/10.1080/17439760.2014.967799

Fritz, B. S., & Avsec, A. (2007). The experience of flow and subjective well-being of music students. *Horizons of Psychology, 16,* 5–17.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). New York, NY: Guilford Press.

Howell, J. L., & Sweeny, K. (2016). Is waiting bad for subjective health? *Journal of Behavioral Medicine, 39,* 652–664. http://dx.doi.org/10.1007/s10865-016-9729-7

Howell, J. L., Sweeny, K., Miller, W., & Shepperd, J. A. (2017). Hot or not? How self-view threat influences avoidance of attractiveness feedback. *Self and Identity*. Advance online publication. http://dx.doi.org/10.1080/15298868.2017.1401552

Jackson, S. A., Ford, S., Kimiecik, J. C., & Marsh, H. W. (1998). Psychological correlates of flow in sport. *Journal of Sport & Exercise Psychology, 20,* 358–378. http://dx.doi.org/10.1123/jsep.20.4.358

Jackson, S. A., Martin, A. J., & Eklund, R. C. (2008). Long and short measures of flow: The construct validity of the FSS-2, DFS-2, and new brief counterparts. *Journal of Sport & Exercise Psychology, 30,* 561–587. http://dx.doi.org/10.1123/jsep.30.5.561

Keller, J., & Bless, H. (2008). Flow and regulatory compatibility: An experimental approach to the flow model of intrinsic motivation. *Personality and Social Psychology Bulletin, 34,* 196–209. http://dx.doi.org/10.1177/0146167207310026

Keller, J., & Blomann, F. (2008). Locus of control and the flow experience: An experimental analysis. *European Journal of Personality, 22,* 589–607. http://dx.doi.org/10.1002/per.692

Keller, J., Ringelhan, S., & Blomann, F. (2011). Does skills–demands compatibility result in intrinsic motivation? Experimental test of a basic notion proposed in the theory of flow-experiences. *The Journal of Positive Psychology, 6,* 408–417. http://dx.doi.org/10.1080/17439760.2011.604041

Layous, K., Nelson, S. K., & Lyubomirsky, S. (2013). What is the optimal way to deliver a positive activity intervention? The case of writing about one's best possible selves. *Journal of Happiness Studies, 14,* 635–654. http://dx.doi.org/10.1007/s10902-012-9346-2

Lazarus, R. S. (1985). The costs and benefits of denial. In A. Monat & R. S. Lazarus (Eds.), *Stress and coping* (2nd ed., pp. 154–173). New York, NY: Columbia University Press.

Lyubomirsky, S. (2008). *The how of happiness: A scientific approach to getting the life you want*. New York, NY: Penguin Press.

Lyubomirsky, S., & Nolen-Hoeksema, S. (1995). Effects of self-focused rumination on negative thinking and interpersonal problem solving. *Journal of Personality and Social Psychology, 69,* 176–190. http://dx.doi.org/10.1037/0022-3514.69.1.176

Lyubomirsky, S., Tucker, K. L., Caldwell, N. D., & Berg, K. (1999). Why ruminators are poor problem solvers: Clues from the phenomenology of dysphoric rumination. *Journal of Personality and Social Psychology, 77,* 1041–1060. http://dx.doi.org/10.1037/0022-3514.77.5.1041

Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 89–105). New York, NY: Oxford University Press.

Nelson, S. K., Fuller, J. A., Choi, I., & Lyubomirsky, S. (2014). Beyond self-protection: Self-affirmation benefits hedonic and eudaimonic well-being. *Personality and Social Psychology Bulletin, 40,* 998–1011. http://dx.doi.org/10.1177/0146167214533389

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science, 3,* 400–424. http://dx.doi.org/10.1111/j.1745-6924.2008.00088.x

Poole, K., Hood, K., Davis, B. D., Monypenny, I. J., Sweetland, H., Webster, D. J. T., . . . Mansel, R. E. (1999). Psychological distress associated with waiting for results of diagnostic investigations for breast disease. *The Breast, 8,* 334–338. http://dx.doi.org/10.1054/brst.1999.0085

Querstret, D., & Cropley, M. (2012). Exploring the relationship between work-related rumination, sleep quality, and work-related fatigue. *Journal of Occupational Health Psychology, 17,* 341–353. http://dx.doi.org/10.1037/a0028552

Rheinberg, F., Vollmeyer, R., & Engeser, S. (2003). Die Erfassung des Flow-Erlebens [The assessment of flow experience] In J. Stiensmeier-Pelster & F. Rheinberg (Eds.), *Diagnostik von selbstkonzept, lernmotivation und selbstregulation* [Diagnosis of motivation and self-concept] (pp. 261–279). Gottingen, Germany: Hogrefe.

Rogatko, T. P. (2009). The influence of flow on positive affect in college students. *Journal of Happiness Studies, 10,* 133–148. http://dx.doi.org/10.1007/s10902-007-9069-y

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67,* 1063–1078.

Sheldon, K. M., Prentice, M., & Halusic, M. (2015). The experiential incompatibility of mindfulness and flow absorption. *Social Psychological and Personality Science, 6,* 276–283. http://dx.doi.org/10.1177/1948550614555028

Shepperd, J. A., Grace, J., Cole, L. J., & Klein, C. (2005). Anxiety and outcome predictions. *Personality and Social Psychology Bulletin, 31,* 267–275.

Sweeny, K. (2012). Waiting well: Tips for navigating painful uncertainty. *Social and Personality Psychology Compass, 6,* 258–269. http://dx.doi.org/10.1111/j.1751-9004.2011.00423.x

Sweeny, K. (2016). *Successful and unsuccessful waiting strategies*. Unpublished data. University of California, Riverside.

Sweeny, K. (in press). On the experience of awaiting uncertain news. *Current Directions in Psychological Science*.

Sweeny, K., & Andrews, S. E. (2014). Mapping individual differences in the experience of a waiting period. *Journal of Personality and Social Psychology, 106,* 1015–1030. http://dx.doi.org/10.1037/a0036031

Sweeny, K., Andrews, S. E., Nelson, S. K., & Robbins, M. L. (2015). Waiting for a baby: Navigating uncertainty in recollections of trying to conceive. *Social Science & Medicine, 141,* 123–132. http://dx.doi.org/10.1016/j.socscimed.2015.07.031

Sweeny, K., & Cavanaugh, A. G. (2012). Waiting is the hardest part: A model of uncertainty navigation in the context of health. *Health Psychology Review, 6,* 147–164. http://dx.doi.org/10.1080/17437199.2010.520112

Sweeny, K., & Dooley, M. D. (2017). The surprising upsides of worry. *Social and Personality Psychology Compass, 11,* e12311. http://dx.doi.org/10.1111/spc3.12311

Sweeny, K., & Falkenstein, A. (2015). Is waiting really the hardest part? Emotional experiences of awaiting and receiving bad news. *Personality and Social Psychology Bulletin, 41,* 1551–1559. http://dx.doi.org/10.1177/0146167215601407

Sweeny, K., & Falkenstein, A. (2017). Even optimists get the blues: Intra-individual consistency in the tendency to brace for the worst.

Journal of Personality, 85, 807–816. http://dx.doi.org/10.1111/jopy.12289

Sweeny, K., & Howell, J. L. (2017). Bracing later and coping better: Benefits of mindfulness during a stressful waiting period. *Personality and Social Psychology Bulletin, 43,* 1399–1414. http://dx.doi.org/10.1177/0146167217713490

Sweeny, K., & Krizan, Z. (2013). Sobering up: A quantitative review of temporal declines in expectations. *Psychological Bulletin, 139,* 702–724.

Sweeny, K., & Miller, W. (2012). Predictors of information avoidance: When does ignorance seem most blissful? *Self and Identity, 11,* 185–201. http://dx.doi.org/10.1080/15298868.2010.520902

Sweeny, K., Reynolds, C. A., Falkenstein, A., Andrews, S. E., & Dooley, M. D. (2016). Two definitions of waiting well. *Emotion, 16,* 129–143. http://dx.doi.org/10.1037/emo0000117

Thomsen, D. K., Mehlsen, M. Y., Christensen, S., & Zachariae, R. (2003). Rumination: Relationship with negative mood and sleep quality. *Personality and Individual Differences, 34,* 1293–1301. http://dx.doi.org/10.1016/S0191-8869(02)00120-4

Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin, 138,* 775–808. http://dx.doi.org/10.1037/a0027600

Wells, A. (1988). Self-esteem and optimal experience. In M. Csikszentmihalyi & I. Csikszentmihalyi (Eds.), *Optimal experience* (pp. 327–341). New York, NY: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511621956.020

Zoccola, P. M., Dickerson, S. S., & Lam, S. (2009). Rumination predicts longer sleep onset latency after an acute psychosocial stressor. *Psychosomatic Medicine, 71,* 771–775. http://dx.doi.org/10.1097/PSY.0b013e3181ae58e8

Zoccola, P. M., Figueroa, W. S., Rabideau, E. M., Woody, A., & Benencia, F. (2014). Differential effects of poststressor rumination and distraction on cortisol and C-reactive protein. *Health Psychology, 33,* 1606–1609. http://dx.doi.org/10.1037/hea0000019

Received September 13, 2017
Revision received February 15, 2018
Accepted May 27, 2018 ■