HIGH RISK, HIGH REWARD: DAILY PERCEPTIONS OF SOCIAL CHALLENGE
AND PERFORMANCE IN SOCIAL ANXIETY DISORDER

by

Dan V. Blalock
A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
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George Mason University
Fairfax, VA
High Risk, High Reward: Daily Perceptions of Social Challenge and Performance in Social Anxiety Disorder

A Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

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DEDICATION

This is dedicated to my mother and father, whose continuous guidance, support, and trust have paved the way for me to get as far as I have.
ACKNOWLEDGEMENTS

I would like to thank the many friends, family members, and labmates who have made this happen. Kyla Machell has kept me sane and helped me throughout my research process. Many labmates – both in MRES and the Kashdan Lab – have helped guide these research questions, analyses, and my thoughts on both. Dr. Kashdan and Dr. McKnight have provided me with innumerable and invaluable resources to create this work – from actual data, to writing and data analysis guidance. Their simultaneously unapologetic and caring stance toward science, friends, and life has given me a great deal of perspective. Finally, thanks to my other committee member, Dr. Kaplan, and the rest of the Psychology department, for creating an environment to learn and grow throughout my graduate education.
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LIST OF ABBREVIATIONS

Social Anxiety Disorder.................................................................SAD
ABSTRACT

HIGH RISK, HIGH REWARD: DAILY PERCEPTIONS OF SOCIAL CHALLENGE AND PERFORMANCE IN SOCIAL ANXIETY DISORDER

Dan V. Blalock, Ph.D.

George Mason University, 2016

Dissertation Director: Dr. Patrick E. McKnight

Social Anxiety Disorder (SAD) is associated with significant impairment in social, occupational, and daily functioning, as well as subjective appraisals of life events as more negative and less positive. Individuals with SAD have difficulty engaging in social situations because their actions are predicated on minimizing the potential for rejection – a potential they perceive as not only possible, but likely. That is, individuals with SAD frequently perceive social situations as challenging, and their performance as subpar. Yet when individuals perceive themselves as succeeding in challenging situations, they typically report these situations as enjoyable and rewarding. This subjective experience of succeeding in a challenging situation has been studied as flow (Csikszentmihalyi, 1975/2000). Forty adults with SAD and 39 matched healthy controls completed a baseline assessment, along with daily and experience sampling entries for 14 days. Results were analyzed using three-level linear mixed effects models, with observations nested within days, nested within participants. Nested-model comparisons also ensured
that increased complexity of the models explained significant variance over more parsimonious models. Results indicated that, although individuals with SAD experienced the same frequency of flow overall in their daily lives (probability=.19; \( \phi = -0.01, p = .83 \)), social experiences led to proportionally more flow in participants with SAD (probability=.20) than their healthy control counterparts (probability=.07; \( b = -1.39, s_e = 0.63, t = 2.21, p = 0.02, OR = 0.25 \)). Moreover, several experiential variables predict the probability of flow during each situation, such as positive emotions and importance ascribed to the event. These results offer several suggestions for how individuals may benefit from seeking out challenging situations that offer maximal rewards. Clinical and research implications are also discussed.
INTRODUCTION

Attentional demands limit human experience; a good example may be with socially anxious people experiencing flow in social situations. Social situations are threatening, and socially anxious people incur huge attentional demands. While devoting attention to monitoring threats, socially anxious people often fail to devote the attention necessary to fully engage in those social situations. We mentioned flow - the perception of optimal performance in challenging situations and often referred to as “in the zone” - because it has attentional demands that compete with those demands that burden socially anxious people. To experience flow, a person must be fully engaged. Competing attentional demands such as these are best illustrated by an example:

John and Sarah have both started a new job and are at happy hour with their new coworkers and managers for the first time - a potentially challenging social situation. John is preoccupied by trying to appear relaxed, while still being vigilant for any signs that his co-workers do not like him. Sarah, meanwhile, realizes the challenge of the social situation yet focuses on getting to know her coworkers and managers better. John struggles to make conversation during the happy hour, while Sarah reports enjoying herself and even losing track of time. While this is a descriptive account of what transpired, it is important to consider why or how it transpired.
In this scenario, Sarah was able to experience flow because she was able to focus on the experience. Though it was challenging, she perceived herself as meeting that challenge. However, John’s social anxiety prevented him from focusing on the experience because his attention shifted to himself and potential negative feedback. It was challenging, but because he could not attend to any information that he was meeting that challenge, he perceived himself as not meeting that challenge. Sarah enjoyed herself and thought the happy hour went well; John did not.

The purpose of this paper is to examine the occurrence of scenarios like this in the everyday lives of people with and without social anxiety disorder (SAD). Due to the attentional demands results from increased perceptions of threat, we argue socially anxious people are more likely to take the role of John in everyday social scenarios like this one. The argument is as follows:

Flow occurs when a person perceives they are meeting the high demands of an activity with an equally high performance, leading to a positive and rewarding experience. Individuals with SAD perceive themselves as deficient, and perceive social situations as a stage on which they display this deficiency. This perceived deficiency biases their attention toward negative images of themselves and toward environmental cues they interpret as evidence they are performing poorly. As attention is a zero-sum resource, socially anxious individuals’ attention moves away from positive indicators of their performance in this social experience. The combination of ample perceived negative feedback and minimal perceived positive feedback leads them to perceive their social performance as deficient. Thus, biased social attention precludes individuals with
SAD from achieving flow in social experiences, because they cannot perceive their social performance as adequate in proportion to the high demands of the social situation.

The remainder of this paper justifies the tenets of this argument through the literature, and then examines this argument descriptively with over 2000 ecologically valid observations that can be categorized by 1) the presence/absence of social anxiety disorder in an individual, 2) the presence/absence of a social situation, and 3) the presence/absence of flow (our measure of being “in the zone”).

**Flow**

Flow experiences represent any positive and inherently rewarding experiences that involve perceiving successful performance in a challenging situation (Csikszentmihalyi, 2009). The perception of control, absorption, and consistent positive feedback necessary to perceive oneself and performing well in these challenging situations (Nakamura & Csikszentmihalyi, 2002; Keller & Bless, 2008) means flow experiences require a large amount of attention. If these attentional demands are met, however, flow experiences consistently correlate with performance increases in several domains like employment settings (Fullagar & Kelloway, 2009), educational settings (Shernoff & Csikszentmihalyi, 2003), and sports settings (Jackson & Csikszentmihalyi, 1999). Moreover, flow experiences are consistently rated as positive experiences (Rogatko, 2009), and have been associated with other indicators of a healthy and happy life such as more positive affect and less negative affect (Delle Fave, Bassi, & Massimini, 2002), satisfaction with life (Asakawa, 2010), psychological well-being (Steele & Fullagar, 2009; Delle Fave, Steca, Bassi, & Caprara, 2009), greater relationship quality
(Graham, 2008), and even increased dopamine receptivity in the brain (Manzano et al., 2002).

The majority of flow research, however, examines situations where a single clear goal is present. If other goals are present in a situation, such as maintaining relationships while playing a sport (Bloch, 2008), then flow experiences occur less frequently - presumably because these other goals compete for a person’s attention. The cognitive biases of individuals with social anxiety consistently push other goals (concealing anxiety and avoiding rejection) to the forefront of their attention. This is especially true in social situations.

**Phenomenology of Social Anxiety Disorder**

Extant research identifies SAD as a disorder defined by clear attentional biases that arise from perceived social threats. Clinicians diagnose individuals with SAD at a relatively high rate for psychological disorders (12.1%; Kessler et al., 2005); this disorder impairs these individuals in several functional domains (McKnight, Monfort, Kashdan, Blalock, & Calton, 2015). SAD negatively impacts well-being, relationship functioning, and achievements in educational and career domains (Schneier et al., 1994), and contributes to a significant financial burden (Tolman et al., 2009).

This disorder, and the people who suffer from it, internalize an intense, persistent fear of having perceived flaws exposed in social situations, leading to negative evaluations, and ultimately, rejection (Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010; Morrison & Heimberg, 2013; Moscovitch, 2009). This intense and persistent fear impairs individuals with SAD generally by fostering emotional hyper-
reactivity and dysregulation (Hermann, Ofer, & Flor, 2004; Hofmann, 2004). More specifically, constant self-focused and self-critical attention (Rapee & Himberg, 1997; Spurr & Stopa, 2002) and constant threat-focused attention (Watson & Friend, 1969; Mogg, Philippot, & Bradley, 2004) impair these individuals’ ability to attend to rewarding social experiences. An unwillingness to tolerate their anxiety also leads to maladaptive attempts to avoid or suppress these experiences, further decreasing the opportunities for rewarding social experiences (Kashdan & Steger, 2006; Kashdan et al., 2013). This cycle maintains social anxiety, and leads to perceptions of poor social performance (Hopko, McNeil, Zvolensky, & Eifert, 2002). These perceptions, and therefore these attentional biases, are antagonistic for the flow experience.

**Diminished Flow in Social Situations: Biased Attention**

Biased attention maintains social anxiety (Spurr & Stopa, 2002; Moskovitch, 2009). Very simply, if socially anxious individuals cannot perceive positive feedback, then they have no evidence contradicting their perceptions of themselves as deficient and social situations as threatening. Thus, it makes sense for socially anxious individuals to perceive social situations as challenging - one prerequisite for the flow experience (Csikszentmihalyi, 2009). Unfortunately, socially anxious individuals’ biased attentional demands preclude them from perceiving skilled performance in these social situations - the other prerequisite for the flow experience. While biased attention represents the bottleneck preventing flow experience, this bottleneck arises from two primary cognitive-behavioral processes in socially anxious individuals.
First, biased attention toward the self increases attentional demands in social situations. Clark and Wells (1995) proposed that individuals with social anxiety perceive themselves as they believe others perceive them in social situations, and that this focus on the self increases access to negative thoughts and emotions and minimizes attention to outside evidence that can disconfirm these negative thoughts. Moreover, socially anxious individuals use these negative thoughts and emotions to distort their views of themselves in social situations, maintaining a negative mental representation of themselves as social actors. While this mental representation of the self receives constant reinforcement from perceived indicators of negative performance (Rapee & Heimberg, 1997), evidence suggests these perceptions do not necessarily relate to actual social performance deficits (e.g., Woody, 1996). Nevertheless, much research supports this self-focused attention as a maintaining factor in negative perceptions of social interactions, both within SAD and in healthy controls (Spurr & Stopa, 2002; Vorauer, 2006). More specifically, shifts away from self-focused attention coincide with decreased anxiety in socially anxious individuals (e.g., Hoffmann, 2000). One experimental study illustrated that shifting socially anxious individuals’ attention away from the self and toward the environment during social interactions resulted in lower situational anxiety and decreased catastrophic thinking (Wells & Papageorgiou, 1998). Self-focused attention is an integral part of conceptualizing socially anxious individuals and their treatment (Moskovitch, 2009), and so represents a primary input driving attention away from positive situational feedback that is necessary for the flow experience.
Second, biased attention toward perceived threats in the environment increases attentional demands in social situations. Fear of negative evaluation increases stress in social situations, especially for those with social anxiety (Watson & Friend, 1969). The associated compensatory behavior - hypervigilant monitoring for signs of rejection in the environment - also occurs to a much greater extent in socially anxious individuals. Several experimental studies have shown that socially anxious individuals are much quicker to attend to angry or disgusted faces than healthy controls, and that this distinction does not carry over to neutral or happy faces (Gilboa-Schechtman, Foa, & Amir, 1999; Mogg, Philippot, & Bradley, 2004). Moreover, recent evidence also suggests socially anxious individuals also have trouble disengaging attention away from disgusted faces (Buckner, Maner, & Schmidt, 2010), and in fact bias their attention away from positive environmental stimuli such as happy faces or words (Mansell, Clark, Ehlers, & Chen, 2002; Taylor, Bomyea, & Amir, 2010). These complementary findings highlight the fact that attention is a zero-sum game, and the attentional demands incurred by socially anxious individuals make it difficult to focus any attention on positive and rewarding aspects of their environment - those necessary for the flow experience.

**Generally Diminished Flow: Experiential Avoidance**

While biased attentional demands serve as the proposed mechanism for why socially anxious individuals are less likely to experience flow specifically in social situations, broader maladaptive emotion regulation strategies may also serve to minimize the chances of flow in their daily lives more generally. Individuals with SAD generally report deficient positive experiences compared to healthy controls (Watson, Clark, &
Carey, 1988; Kashdan, 2007), and flow experiences represent one particular example of positive “optimal” experiences (Csikszentmihalyi, 1975/2000). Thus socially anxious individuals likely experience fewer flow events in general, and potentially because of the same culprit - experiential avoidance.

Avoiding anxiety-provoking situations presents a constant challenge for individuals with SAD because we are social animals, necessitating almost daily social interactions to get through life. However, people with SAD may engage in experiential avoidance - efforts to escape, avoid, alter, or conceal undesirable emotions and thoughts (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Much research has demonstrated that engaging in experiential avoidance, which socially anxious individuals do frequently, is associated with fewer daily positive emotions (Kashdan & Steger, 2006), lower daily well-being (Machell, Goodman, & Kashdan, 2015), and is in fact a major distinguishing feature between those with SAD and without (Kashdan et al., 2013). Moreover, consistently engaging in effortful avoidance of anxious emotions and thoughts may minimize self-regulatory energy available to seek out rewards in the environment (Kashdan, Weeks, & Savostyanova, 2011). Flow experiences in particular are rewarding experiences in the environment that require focused attention and engagement regardless of what other people are present (Graham, 2008), as they are challenging experiences (Rogatko, 2009). Therefore, individuals with social anxiety are especially unlikely to engage in flow experiences, because the frequent and effortful use of experiential avoidance leaves no energy or opportunity to engage in these experiences that require explicit engagement and focus of attentional demands.
The Present Study

Taken together, the defining characteristics of social anxiety disorder - critical self-focused attention, threat-focused attention, and experiential avoidance - produce a profile of taxed attentional demands that leaves little room to actively engage in rewarding aspects of situations enough to produce flow experiences. These attentional demands are especially likely to inhibit flow experiences, specifically because flow experiences require ample attention to focus toward challenging situations and ample attention to perceive oneself as performing well in these situations. Given this argument, it is necessary to clarify why perceiving optimal performance in challenging situations is sufficient to produce these positive and intrinsically rewarding experiences. Notably, while performance and skill are not the same, perceived performance translates to perceived skills (Hopko et al., 2002), making them interchangeable in this context.

Flow as Perceived Optimal Performance in Challenging Situations

As Csikszentmihalyi (2009, p.398) states: “at the phenomenological level it is the dynamic balance between challenges and skills that provides optimal experience and the maintenance of this balance becomes intrinsically rewarding.” To date, the majority of investigations into flow have measured flow as an experience where high perceived challenges are balanced by high perceived skills (e.g., Massimini & Carli, 1988; Nakamura, 1988; Csikszentmihalyi & LeFevre, 1989; Wells, 1988; Chen et al., 1999; Delle Fave & Massimini, 2005; Guo & Poole, 2009; Keller & Bless, 2008; Mesurado, 2009; Moneta & Csikszentmihalyi, 1996; Pearce et al., 2005; Sherry, 2004), though some other questionnaires are sometimes used (see Sheldon et al., 2015 for an example).
Despite the favorability of this measurement approach in the literature, it is still imperative to review how the skill/challenge definition relates to various descriptors of flow experiences.

The vast majority of flow research has been correlational, and often involves experience sampling (as does the current study). Csikszentmihalyi and LeFevre (1989) provided the strongest test of the skill/challenge ratio using this paradigm by observing individuals in three different jobs (management, clerical, and blue-collar) in both work and leisure settings. By examining different people across very different settings, they were allowing two other predominant factors (who it is and what they are doing) to drive the quality of experiences. Work settings were more likely to produce flow than leisure settings. Yet regardless of work/leisure setting, and regardless of the job the individual was performing, when people were in flow, they were also much more likely to experience more happiness, more potency, more satisfaction, better concentration, and more creativity. Moreover, whether participants had these positive experiences or not was driven much more by flow than the situation, or the particular job of the individual. However, despite this and other studies across 30 years (e.g., Carli, 1986; Voelkl & Ellis 1990; Moneta and Csikszentmihalyi 1999; Bassi, Sartori, & Delle Fave, 2010) supporting the relationship between high skill/challenge balance and other indicators of the quality of experience, only recently has an experimental paradigm unpacked the causal order of these aspects of flow.
In an explicit experimental test of whether the skill/challenge ratio produced the positive aspects of an experience associated with flow, Keller and Bless (2008) manipulated the perceived difficulty of a task (playing Tetris) across two samples. They found that individuals who reported the perceived difficulty to be comparable to their own skill level (the adaptive condition) performed the best, perceived time as passing more quickly, and reported the greatest involvement and enjoyment while playing the game. Notably, individuals in the boredom condition, where difficulty was far below their perceived skills, and overload condition, where difficulty was considerably above their perceived skills, did not differ from each other in any of these categories. Thus, consistent correlative evidence, and some recent experimental evidence, has vetted a balance of high perceived skills (or performance) and high perceived challenges as an appropriate definition of flow - in that they are strongly related and causal to many descriptors of the flow experience.

**Hypotheses**

Flow experiences occur naturally in situations where perceived performance matches the perceived challenge of a situation. As reviewed, the attentional biases in SAD often inhibit these perceptions. While flow may be less likely for individuals with

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1Løvoll and Vittersø (2014) recently argued with a similar experimental paradigm that the skill/challenge balance was not a good indicator of flow experiences. While their results give modest support to their assertion, their operational definition of the skill/challenge balance was either an interaction between grand-mean-centered reports of skills and challenges, or an exact match of ratings on a 1-7 likert scale above an objective cutoff of 4. The former measurement allows for a low skill/challenge balance (apathy in the EFM) to equate to a high/skill challenge balance (Flow). The latter measurement restricts the skill/challenge balance to require exactly the same rating, rather than both being above one’s subjective mean. Both measurements also categorize flow experience in objective, not within-person, standards. Thus, while intriguing, their measurement of the skill/challenge balance is incorrect, and so their conclusions cannot be interpreted in this framework.
SAD, especially in social situations, this does not altogether negate the possibility of these experiences. Attentional Control Theory (Eysenck et al., 1992; Eysenck, Derakshan, Santos, & Calvo, 2007) posits that, to a certain level, anxiety does not necessarily impair performance (effectiveness), but simply increases the cognitive resources needed to meet that same level of performance (efficiency). Thus, socially anxious individuals’ biased attention may simply necessitate more effort to meet a similar level of perceived performance. Even still, evidence suggests this possibility is rarely the case (Kashdan, Weeks, & Savostyanova, 2011; Kashdan et al., 2013). Increases in threat-related stimuli (a natural consequence of social situations) are likely to overload socially anxious individuals’ attentional capacity, such that their perceived performance does suffer, and positive experiences/emotions are minimized. With this framework in mind, Hypotheses 1 and 2 are as follows:

**H1:** The probability of a flow event occurring will be lower in individuals with SAD than healthy controls, regardless of the situation. Logically: \( p(\text{Flow}|\text{SAD}) < p(\text{Flow}|\text{HC}) \).

![Figure 1. Graphical Representation of Hypothesis 1.](image)

**H2:** The difference in the probability of a flow event occurring in a social situation in SAD vs healthy controls will be greater than the difference in the probability of a flow
event occurring in general in SAD vs healthy controls. Essentially, a larger effect of diagnostic status affecting the probability of flow ought to be evident in social situations compared to all situations. Logically: $\Delta(p(\text{Flow}|\text{SAD}), p(\text{Flow}|\text{HC})) < \Delta(p(\text{Flow}|\text{SAD & Social Situations}), p(\text{Flow}|\text{HC & Social Situations}))$.

Figure 2. Graphical Representation of Hypothesis 2.

While studying the occurrence of a single flow experience is useful, these experiences do not happen in a vacuum, and so may have downstream effects on individuals within the context of their daily lives. With this effect in mind, much research suggests individuals with SAD are less likely to capitalize on positive experiences in general (Hirsch & Mathews, 2000), and are especially likely to discount evidence of positive social experiences as inaccurate (Weeks, Heimberg, & Rodebaugh, 2008) or due to external factors (Heimberg & Becker, 2002). Consistent with the discounting effect Hypothesis 3 is as follows:

**H3:** The probability of a flow event occurring on a subsequent day, given a flow event occurring on the previous day, will be lower if the individual experiencing the flow event
on the first day has SAD. Logically: \( p(T_2 \text{ flow} \mid \text{SAD} \& T_1 \text{ Flow}) < p(T_2 \text{ flow} \mid \text{HC} \& T_1 \text{ Flow}) \).

Figure 3. Graphical Representation of Hypothesis 3.

Finally, although we expect individuals with SAD to generally experience less flow, and especially less flow in social situations, there is heterogeneity in these experiences. Some other situational factors may temporarily outweigh the strong attentional biases of socially anxious individuals, allowing them to experience flow when they might otherwise not. A high state motivation has been shown to boost attentional resources for short periods of time (see Hagger, Wood, Stiff, & Chatzisarantis, 2010 for a meta-analysis), and one potential source of motivation is the perceived importance of a given activity. Moreover, engaging in flow experiences naturally produces positive affect (Delle Fave, Bassi, & Massimini, 2002), and any reported positive affect implies positive attributions or perceptions during these experiences. Hypothesis 4 & 5 are as follows:
**H4**: Flow will be predicted by the importance of an experience but the effect will be moderated by SAD status. Logically: $\Delta(p(\text{Flow}|\text{SAD & Low Importance}), p(\text{Flow}|\text{HC & Low Importance})) > \Delta(p(\text{Flow}|\text{SAD & High Importance}), p(\text{Flow}|\text{HC & High Importance}))$.

![Figure 4](image_url)

Figure 4. Graphical Representation of Hypothesis 4.

**H5**: Flow will be predicted by positive affect reported in the experience, but the effect will be moderated by SAD status. Logically: $\Delta(p(\text{Flow}|\text{SAD & Low Positive Affect}), p(\text{Flow}|\text{HC & Low Positive Affect})) > \Delta(p(\text{Flow}|\text{SAD & High Positive Affect}), p(\text{Flow}|\text{HC & High Positive Affect}))$.

![Figure 5](image_url)

Figure 5. Graphical Representation of Hypothesis 5.
METHOD

Participants

Our sample included 86 participants, of whom 43 had generalized SAD and 43 were healthy controls (HC). After seven participants were excluded from analyses due to insufficient experience sampling data provided, the final sample consisted of 40 participants with SAD and 39 HCs, who were matched on age, gender, and ethnicity. Approximately 64.6% of participants were female, with an average age of 28.9 years (SD = 8.8). With regard to race/ethnicity, 54.4% of participants self-identified as “Caucasian/White,” 19% as “African-American/Black,” 12.7% as “Hispanic/Latino,” 5.1% as “Asian-American,” and 8.9% as “Other.” There were no significant differences between groups on demographic variables (see Farmer & Kashdan, 2013).

Procedure

Participants were recruited from the Northern Virginia community through targeted online advertisements and flyers on bulletin boards. When potential participants telephoned to express interest in the study, a trained research assistant completed an initial screening by phone and scheduled a face-to-face appointment with those with potential to be in the SAD or HC group. During these appointments (N = 122), participants completed individual difference questionnaires and participated in a semi-structured clinical interview to determine eligibility for the study. For the SAD group,
generalized SAD had to be the primary or most severe diagnosis if other comorbid psychiatric conditions were present. Due to concerns about risk and validity of reports, our exclusion criteria included comorbid substance dependence, psychotic symptoms, or active suicidal ideation. Only participants with no Axis I diagnoses were included in the HC group.

Following these assessments, qualified participants were instructed on how to complete experience sampling entries for the following 14 days. Hand-held computers (Palm Pilot Z22) were programmed using the Purdue Momentary Assessment Tool (PMAT; Weiss, Beal, Lucy, & MacDermid, 2004) to prompt participants randomly between three and five times each day with a small battery of questions about their current experience. For the end-of-day entries used in these analyses, participants were asked to log into an online portal between 6:00 P.M. of the day in question and noon on the following day (preferably as close to bedtime or wake time as possible to minimize memory biases). Several efforts were made to encourage compliance: 1) brief measures, 2) date and time stamping of entries to verify timely completion, 3) incentive-based compensation ranged from $165 to $215 with consistent, timely completion of entries, and 4) e-mail reminders sent several days into data collection. Following the experience sampling timeframe, participants returned to the laboratory for an in-person debriefing. No significant differences were found on meaningful variables or demographic variables between in the healthy control and SAD groups, or with respect to missing observational data points within participants. Complete details of our procedure can be found in Kashdan et al. (2013).
Measures

*Diagnostic interview.* Doctoral-level clinical psychology students administered the *Structured Clinical Interview for DSM-IV Axis I Disorders* (SCID-I/NP; First, Spitzer, Gibbon, & Williams, 2002) to assess for SAD, mood disorders, and other Axis I diagnoses. Interviewers were supervised by a clinical psychologist. Moreover, interviews were videotaped, and 45 were randomly selected to be evaluated by a second coder. Inter-rater agreement was good (Cohen’s kappa = .87). The SCID has also demonstrated good inter-rater and test-retest agreement in other research (Zanarini et al., 2000). To ensure confidence in our SAD diagnoses and determine SAD subtype, we also administered the SAD module of the *Anxiety Disorders Interview Schedule for DSM–IV: Lifetime Version* (Di Nardo, Brown, & Barlow, 1994).

*Emotions.* Participants first rated how much eight emotional adjectives described them “right now” when the random prompt occurred using a 5-point scale from 1 (*very slightly/not at all*) to 5 (*extremely*). Emotion words selected from the *Positive and Negative Affect Schedule—Expanded Form* (PANAS-X; Watson & Clark, 1994), Negative emotions were anxious/nervous, angry, sad, and sluggish. Positive emotions were content, relaxed, enthusiastic, and joyful.

*Event questions.* Participants then responded to a series of questions describing the event they were engaged in when the random prompt occurred. Participants: 1) chose one of twelve codes for “what” they were doing, which were subsequently recoded into “social” or “nonsocial” events; 2) chose “why” they were doing this events, coded as “I wanted to,” “I had to,” or “I had nothing else to do”; 3) recorded the number of people
involved in that moment; and 4) rated how stressful, challenging, and important this event was, as well as how competent they felt during the event on a 0 (not at all) to 9 (extremely) scale.

Flow. Using the coding scheme developed by Csikszentmihalyi & LeFevre (1989), flow was assessed as a state in which each participant was engaged in a challenging situation and also felt competent in that situation. Both the challenge of the situation and competence of the participant were assessed as normative within-person phenomena such that a challenging situation was defined as above-average challenge ratings for an individual on the question “How challenging or demanding is the main thing you are doing?”, and competence in a situation was defined as above-average competence ratings by that individual on the question “How competent do you feel during the main thing you are doing?” Answers for both questions were mean-standardized within-person, and then recoded such that any positive value (representing a person’s rating of challenge or competence as above their average rating) was coded as 1 and any negative value as 0 (representing a person’s rating of challenge or competence as above their average rating). A product of the two recoded binary items was then created as our binary measure of flow experience (1=Flow, 0=Nonflow). 431 out of 2291 total product terms (19%) were measured as events in which a participant was in flow.

Analytic Approach

Demographic information on the sample, including equivalence between healthy control and SAD groups and missing observations, can be found in Kashdan et al. (2013). Descriptive information, including means, SDs, ranges, normality, and internal
consistencies were calculated. A bivariate correlation matrix was also constructed on all relevant variables. Inferential results were analyzed using either a chi-square (for the simple comparisons) or linear mixed effects models (for the conditional and complex comparisons with the lme4 package by Bates et al., 2015); all analyses were run using R (version 2.15.2; R Development Core Team, 2012). Three-level linear mixed effects models were used to account for the natural dependence of observations nested within days, as well as days within people. To ensure the parsimony of these models, nested model comparisons were conducted. This ensured that the addition of random effects, additional predictors, and any interaction terms explained significant increases in variance over simpler models. To test the extent of carry over effects, a lagged variable was created representing whether the following event was a flow or non-flow event for every observation. Timestamps were also used to create a variable representing the amount of time between the current event and the lagged event.
RESULTS

Descriptive information of variables across the entire sample is presented below in Table 1. The following inferential results are organized by each of the five hypotheses.

Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (Flow vs. Nonflow)</td>
<td>0.19</td>
<td>0.39</td>
<td>0-1</td>
</tr>
<tr>
<td>Competence (Comp vs. Not)</td>
<td>0.63</td>
<td>0.48</td>
<td>0-1</td>
</tr>
<tr>
<td>Challenge (Challenge vs. Not)</td>
<td>0.38</td>
<td>0.49</td>
<td>0-1</td>
</tr>
<tr>
<td>Activity (Social vs. Nonsocial)</td>
<td>0.10</td>
<td>0.30</td>
<td>0-1</td>
</tr>
<tr>
<td>Competence</td>
<td>6.44</td>
<td>2.59</td>
<td>0-9</td>
</tr>
<tr>
<td>Challenge</td>
<td>2.16</td>
<td>2.67</td>
<td>0-9</td>
</tr>
<tr>
<td>Activity (# of People Present)</td>
<td>0.71</td>
<td>1.60</td>
<td>0-10</td>
</tr>
<tr>
<td>Positive Affect Intensity</td>
<td>2.79</td>
<td>1.08</td>
<td>1-5</td>
</tr>
<tr>
<td>Negative Affect Intensity</td>
<td>1.52</td>
<td>0.63</td>
<td>1-5</td>
</tr>
<tr>
<td>Activity Importance</td>
<td>4.76</td>
<td>3.09</td>
<td>0-9</td>
</tr>
<tr>
<td>Activity Stress</td>
<td>1.38</td>
<td>2.28</td>
<td>0-9</td>
</tr>
</tbody>
</table>
**H1: Individuals with SAD experience fewer flow events compared to Healthy Controls**

We argued that SAD may inhibit flow opportunities and, as a result, those who have SAD will have a lower probability of experiencing flow events - compared to healthy controls. Our hypothesis was not supported by the data. The probability of flow in individuals with SAD (P(F)=.19, SD=.39) was not significantly different from the probability of flow in healthy controls (P(F)=.19, SD=.39; $\chi^2=0.05, p=.83, \phi=-0.01$).

Counts of flow events and probabilities broken down by diagnostic status are presented in Table 2. As flow is represented by the combination of above-average perceived challenges and above-average perceived skills, it is helpful to examine these variables independently. Individuals with SAD did not perceive situations as significantly more challenging (M=2.25; scale ranged from 0 to 9) than healthy controls (M=2.08; $t=1.55$, p=.12). However, individuals with SAD (M=5.95) did perceive themselves as performing significantly less competently across situations than healthy controls (M=6.90; $t=8.94$, p<.001). Thus, although individuals with SAD reported lower levels of competent performance across situations, their probability of perceiving high performance in challenging situations (i.e., flow) is not significantly different than healthy controls.

---

2 When perceived challenges and perceived performance were mean-split within-person to create the dichotomous flow variable, the between-group results mirrored that of the raw unstandardized challenge and performance variables. Individuals with SAD did not report significantly more experiences as above-average challenges (prob=.39) than did healthy controls (prob=.38; $X^2=0.43$, p=.51). However, individuals with SAD did report above-average performance (prob=.60) in significantly fewer situations than did healthy controls (prob=.66; $X^2=7.29$, p<.01).
H2: Individuals with SAD experience disproportionately fewer flow events in social situations compared to Healthy Controls

We argued that SAD may especially inhibit flow opportunities in social situations and, as a result, those who have SAD will have a lower probability of experiencing flow events in social situations compared to situations in general - and this discrepancy will be larger than that in healthy controls. Hypothesis two was not supported, and evidence was in the opposing direction. First, to determine the appropriate model to test, we ran nested-model comparisons, beginning with a base model including no predictors and only fixed effects. Decreases in the Bayesian Information Criterion (BIC) were used to assess the utility of increased predictors against the decrease in parsimony of the model (Singer & Willett, 2003). The inclusion of the bivariate situation predictor (social vs. nonsocial) accounted for a significant increase in variance explained (ΔBIC=-1.2; $X^2=8.95$, $p<.01$).
The inclusion of the bivariate SAD diagnosis, and interaction between SAD diagnosis and situation predictor accounted for an increase in variance explained that trended toward significance ($X^2=4.94, p=.08$), yet did not appropriately offset the decreased parsimony of a more complex model ($\Delta BIC=11.5$). Given that these were our a priori predictors, however, we decided to retain them in the model. The inclusion of intercepts as random effects also accounted for an increase in variance explained over the fixed-effects only model ($X^2=9.65, p<.05$), although again this increased variance explained did not offset the severely decreased parsimony of the model containing separate estimates for each participant ($\Delta BIC=21$). The inclusion of slopes as random effects did not account for a significant increase in variance ($X^2=0.01, p=.99$).

Due to the small increase in variance explained by greatly increasing the complexity of our model, simpler fixed-effects only generalized linear models were also conducted to examine the possibility of underpowering our results with a complex model. The effect sizes remained consistent, and the decreased standard errors associated with fixed-effects only models did not alter the significance (or nonsignificance) of any effects. Therefore, in an effort to provide conservative estimates of results, our final model is a linear mixed-effects model with random intercepts only. Fixed-effects results are presented below.

The difference in probabilities of flow between nonsocial and social situations was significantly higher in individuals with SAD ($P(F|NS)=.18$, $P(F|S)=.20$, $\Delta P(F)=.02$) than healthy controls ($P(F|NS)=.21$, $P(F|S)=.07$, $\Delta P(F)=-.14$; $b=-1.39$, $se=0.63$, $t=-2.21$, $p=0.02$, OR=0.25). Counts of flow events and probabilities broken down by diagnostic
status and type of situation are presented in Table 3. In probing the interaction, individuals with SAD saw a small and nonsignificant increase in the probability of flow between nonsocial and social situations ($b=0.07$, $se=0.28$, $t=0.25$, $p=.80$, $OR=1.07$), whereas healthy controls saw a large *decrease* in the probability of flow between nonsocial and social situations ($b=-1.30$, $se=0.35$, $t=-3.68$, $p<.001$, $OR=0.27$). Thus, not only do individuals with SAD not show decrements in the probability of flow experiences in social situations, but they seem to be doing better than their healthy control counterparts who do see a large decrement in the probability of flow in social situations.

**Figure 7.** Graphical Representation of Results for Hypothesis 2.
Table 3. Flow Events by Diagnostic Status and Situation Status.

<table>
<thead>
<tr>
<th></th>
<th>SAD</th>
<th></th>
<th>Control</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonsocial</td>
<td>Social</td>
<td>Nonsocial</td>
<td>Social</td>
</tr>
<tr>
<td>Flow</td>
<td>186</td>
<td>18</td>
<td>218</td>
<td>9</td>
</tr>
<tr>
<td>Nonflow</td>
<td>820</td>
<td>74</td>
<td>839</td>
<td>127</td>
</tr>
<tr>
<td>Prob Flow</td>
<td>.18</td>
<td>.20</td>
<td>.21</td>
<td>.07</td>
</tr>
<tr>
<td>Δ Prob</td>
<td>+.02</td>
<td></td>
<td>-.14</td>
<td></td>
</tr>
</tbody>
</table>

**H3: Individuals with SAD experience fewer subsequent flow events following initial flow events compared to Healthy Controls**

We argued that SAD may inhibit the ability to capitalize on flow events with subsequent flow events and, as a result, those who have SAD will have a lower probability of a subsequent flow event following an initial flow event - compared to healthy controls. Our hypothesis was not supported. The probabilities of a subsequent flow event following an initial flow event was not significantly lower in individuals with SAD (\(P(F)=.29\)) than healthy controls (\(P(F)=.30; b=-0.03, se=0.31, t=-0.10, p=.92, OR=0.97\)). Counts of flow events and probabilities broken down by diagnostic status and preceding flow or nonflow event are presented in Table 4. Although the interaction being nonsignificant, the main effect of a flow event predicting the subsequent flow event was marginally significant (\(b=0.50, se=0.26, t=1.93, p=.05\)), even when controlling for length of time between flow events, which was a nonsignificant predictor. When examined within each diagnostic category, flow events significantly predicted subsequent flow events.
events in both individuals with SAD ($b=0.70$, $se=0.24$, $t=3.46$, $p<.001$, OR=2.01) and healthy controls ($b=0.81$, $se=0.20$, $t=4.13$, $p<.001$, OR=2.25). Thus, it appears there is some evidence for a carryover effect of flow predicting subsequent flow; however this carryover does not differ between individuals with SAD and healthy controls.

![Graphical Representation of Results for Hypothesis 3.](image)

Figure 8. Graphical Representation of Results for Hypothesis 3.

<table>
<thead>
<tr>
<th></th>
<th>SAD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If T1 Flow</td>
<td>If T1 Nonflow</td>
</tr>
<tr>
<td>Prob T2 Flow</td>
<td>29%</td>
<td>16%</td>
</tr>
<tr>
<td>Prob T2 Nonflow</td>
<td>71%</td>
<td>84%</td>
</tr>
</tbody>
</table>

T2 Flow Odds: .41, or 1 to 2.45 .19, or 1 to 5.25 .43, or 1 to 2.33 .19, or 1 to 5.25

Δ Log Odds: .22 .24

*Note.* Length of time between flow events was also used as a covariate.
**H4: Importance of an event will predict the probability of experiencing flow in that event differently for individuals with SAD and Healthy Controls**

We argued that ascribing more importance to an event may increase the probability of that being a flow event, and that this association might be different in individuals with SAD. Our hypothesis was partially supported. Ascribing more importance to an event did significantly increase the probability of it being a flow event ($b=0.27$, $se=0.05$, $t=6.08$, $p<.001$, $OR=1.31$); however, this effect was not moderated by SAD diagnosis ($b=0.02$, $se=0.06$, $t=0.23$, $p=.82$, $OR=1.02$). Counts of flow events and probabilities broken down by diagnostic status and one standard deviation above and below average rated importance are presented in Table 5. When examined within each diagnostic category, importance of an event significantly predicted the probability of experiencing flow in both individuals with SAD ($b=0.28$, $se=0.05$, $t=5.75$, $p<.001$, $OR=1.32$) and healthy controls ($b=0.27$, $se=0.05$, $t=5.83$, $p<.001$, $OR=1.31$). Thus, it appears ascribing more importance to an event is equally likely to increase the probability of experiencing flow in that event for individuals with SAD and healthy controls.

![Graphical Representation of Results for Hypothesis 4](image-url)

Figure 9. Graphical Representation of Results for Hypothesis 4.
Table 5. Flow Events by Importance of Event and Diagnostic Status

<table>
<thead>
<tr>
<th></th>
<th>SAD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+1SD Importance</td>
<td>-1SD Importance</td>
</tr>
<tr>
<td>Flow</td>
<td>70</td>
<td>10</td>
</tr>
<tr>
<td>Nonflow</td>
<td>178</td>
<td>265</td>
</tr>
<tr>
<td>Prob Flow</td>
<td>31%</td>
<td>04%</td>
</tr>
<tr>
<td>Δ Prob Flow</td>
<td>.27</td>
<td>.32</td>
</tr>
</tbody>
</table>

**H5: Positive affect during an event will predict the probability of experiencing flow in that event differently for individuals with SAD and Healthy Controls**

We argued that positive affect experienced during an event may increase the probability of that being a flow event, and that this association might be different in individuals with SAD. Our hypothesis was partially supported. While positive affect did not significantly predict increases in the probability of a flow event (b=0.17, se=0.11, t=1.53, p=.13, OR=1.19), the interaction between positive affect and SAD diagnosis did significantly predict the probability of a flow event (b=-0.41, se=0.15, t=-2.78, p=.005, OR=0.66). Interestingly, with positive affect as a covariate, the main effect for SAD diagnosis also became a significant predictor of the probability of a flow event (b=1.17, se=0.45, t=2.60, p=.009, OR=3.22). Counts of flow events and probabilities broken down by diagnostic status and one standard deviation above and below average rated importance are presented in Table 6. When examined within each diagnostic category, positive affect significantly predicted the probability of experiencing flow in individuals
with SAD (b=0.13, se<0.01, t=115.90, p<.001, OR=1.14) but not in healthy controls (b=-0.19, se=0.13, t=-1.51, p=.13, OR=0.83). Thus, positive affect during an event seems to increase the probability of individuals with SAD experiencing flow during that event, but does not significantly impact healthy controls’ chances of experiencing flow.

![Figure 10. Graphical Representation of Results for Hypothesis 5.]

Table 6. Flow Events by Positive Affect During Event and Diagnostic Status

<table>
<thead>
<tr>
<th></th>
<th>SAD</th>
<th>Control</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+1SD PA</td>
<td>-1SD PA</td>
<td>+1SD PA</td>
<td>-1SD PA</td>
</tr>
<tr>
<td>Flow</td>
<td>16</td>
<td>60</td>
<td>63</td>
<td>10</td>
</tr>
<tr>
<td>Nonflow</td>
<td>68</td>
<td>324</td>
<td>315</td>
<td>53</td>
</tr>
<tr>
<td>Prob Flow</td>
<td>19%</td>
<td>16%</td>
<td>17%</td>
<td>16%</td>
</tr>
<tr>
<td>Δ Prob Flow</td>
<td><strong>.03</strong></td>
<td><strong>.01</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

While individuals with SAD do not experience fewer flow events in their daily lives than healthy controls, they do paradoxically appear to experience more flow events in social situations than healthy controls. These findings appear contrary to not only our initial hypotheses, but a wealth of literature suggesting socially anxious individuals experience decreased positive emotions and events in daily life.

A host of research supports the notion that individuals with SAD have deficient positive experiences (Watson, Clark, & Carey, 1988; Kashdan, 2007), fewer daily positive emotions (Blalock, Kashdan, & Farmer, 2015; Kashdan & Steger, 2006), and lower daily well-being (Machell, Goodman, & Kashdan, 2015). Moreover, experiential avoidance of anxious emotions and thoughts require great effort (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), leaving these individuals with a limited amount of energy to pursue rewarding positive experiences in social situations (Kashdan, Weeks, & Savostyanova, 2011). Flow experiences in particular are challenging events that require a great deal of effort (Csikszentmihalyi, 2009). So why do these particular positive experiences that require more effort occur more often in individuals with SAD than healthy controls, but only in social situations? If individuals with SAD are less sensitive to the rewards in their environment (Kashdan et al., 2013), how do they find themselves in stressful social situations that produce as many flow events as the remainder of their
lives? I address each of these discrepancies and their implications with a more nuanced discussion below.

**Flow as a Skill/Challenge Balance**

One important distinction of this work is not to say that these particular positive experiences - captured as flow - occur at even a moderate frequency, but rather to account for the variations in the low frequencies of occurrence. Thus, the fact that individuals with SAD experience flow in social situations *to the same degree* as they do in other situations, and *more often* than healthy controls do in social situations, is not the same as saying they experience flow frequently. Decomposing the experience of flow illuminates exactly why these findings occurred, why they are not inconsistent with previous literature, and what potential mechanisms are likely at play. So why do individuals with SAD experience flow more frequently than healthy controls only in social situations?

The answer is the exact reason why these positive experiences require more effort - they can only occur during challenging situations.

When looking at the individual frequencies of flow events, we can see that social situations do not dramatically increase the probability of flow for individuals with SAD, but rather dramatically decrease the probability of flow for healthy controls. This is driven primarily by a decrease in the perception of social situations as challenging by healthy controls (only 13% of social situations are challenging, whereas 40% of all other situations are challenging). In contrast, individuals with SAD maintain a similar perception of social situations as being as challenging as other situations (37% of social situations are challenging, and 39% of all other situations are challenging). Surprisingly,
Although healthy controls did perceive themselves as performing better in social situations (74% in social situations versus 65% in other situations), individuals with SAD did not perceive a dramatic drop off in performance during social situations (58% in social situations versus 60% in other situations). Thus, the fact that social situations did not present a challenge to healthy controls precluded them from experiencing flow as often in these situations. Individuals with SAD, however, maintained the same opportunity to experience flow in social situations, indicating that their cognitive biases may be overcome on occasion to reap environmental rewards (Kimbrel, Nelson-Gray, & Mitchel, 2012). Healthy controls, however, are consistently more certain of how they are being evaluated, and less worried about potential repercussions (Vorauer, 2006), and so little to no challenge exists for them in most social situations.

**Biased Attention and Selective Socialization**

Although individuals with SAD experience roughly the same number of flow events in social situations as in nonsocial situations, this number is still quite low. This is not a story about the positive effects incurred by having SAD, but rather the negative effects incurred by not seeking out challenging situations. Some evidence suggests that people spend a large portion of their time (47%) with “wandering minds,” and that this lack of focus on the present moment dampens happiness, regardless of whatever else someone is focusing on (Killingsworth & Gilbert, 2010). Thus, the current surprising results along with previous research on the maintaining factors of SAD offer at least two illustrative ways to increase flow and reduce “mind wandering” in general. First, the subjective challenge of social situations that arises from SAD individuals’ biased
attention may at least provide increased opportunity for flow, even if these events are still generally more distressing. Second, the subjective challenge of social situations may persuade individuals with SAD to only selectively seek out social situations that are likely to offer enough reward to counteract the anticipated distress of these situations. Selectively seeking out these extra rewarding situations may also provide an increased opportunity for flow.

Although we do not have direct evidence of biased attention as the mechanism by which SAD influences the likelihood of experiencing flow, these results can still be viewed in light of biased attention contributing to the daily flow experiences of individuals with SAD. While social situations appear to offer individuals with SAD more opportunity to experience flow, large disparities still exist in these individuals’ perceptions of performance and challenge in these situations compared to healthy controls (Foa et al., 1996). That is, individuals with SAD still experience social situations as a performance domain akin to many other performance domains in their daily life - one in which the risk of rejection is very salient (Brown & Stopa, 2007). In behavioral terms, the increased salience of rewards and punishments focuses attention and increases effort expended to claim those rewards or avoid those punishments (e.g., Hopko, Lejuez, Ruggiero, & Eifer, 2003; Hopko, Robertson, & Lejuez, 2006). While the salience of punishment in social situations may unduly tax socially anxious individuals’ attentional resources (Kashdan, Weeks, & Savostyanova, 2011), this increased exposure to challenging situations yields more opportunity for flow experiences, as the current results suggest. In this sample, most healthy controls were in their comfort zone in social
situations. Finding situations with increased salience of consequences (both reward and punishment) may very generally create more opportunities for flow.

A consequence of this increased salience of punishment in SAD is that these individuals likely attempt to be more selective of the social situations they are in (Kimbrel, 2008), increasing the chances that socializing is worth the distress and potential rejection. The current data speak somewhat to this imbalanced selectivity, as individuals with SAD only reported 92 social situations as opposed to healthy controls’ 136 social situations. This imbalance means that healthy controls needed 150% of the number of social situations to produce half the number of flow experiences as individuals with SAD. If these healthy controls had selected or sought out more challenging and salient social interactions, flow experiences likely would have increased in social situations. Thus, selecting more challenging social situations and focusing attention on the present moment may provide some insight into increasing flow experiences. The results of the current study, however, provide more prescriptive information for how all individuals, but especially those with SAD may be able to “flow hack” their environment.

**Implications for SAD**

If constantly being presented with challenging situations simultaneously offers both benefits (as this study suggests) and detriments (as extant research suggests) to individuals with SAD, how might we use this knowledge to achieve the benefits without the detriments? In other words, can individuals with SAD “flow hack” social situations? The current results offer at least two possible buffers by which individuals with SAD may have a better chance at achieving flow in these already challenging social situations.
Situations deemed more important were more likely to induce flow for both healthy controls and individuals with SAD. Across all conditions, flow was most likely when individuals reported the situation was important (33% of the time). Important situations possess increased salience of risks and rewards, which motivates more engagement (Hopko, Robertson, & Lejuez, 2006). While this increased salience leads to biased attention in social situations for individuals with SAD, it also serves to focus attention in the present moment more generally. This further underscores the notion that flow is more likely to be achieved when an individual’s attention is focused in the here and now. If individuals with SAD (or everyone really) can engage in situations they deem more important, they may create more opportunities to experience flow.

Situations where individuals rated more positive affect were only more likely to produce flow experiences for individuals with SAD. Though in general individuals with SAD experienced less positive affect, it seems that experiencing positive affect is more helpful for predicting flow events in individuals with SAD than in healthy controls. For individuals with SAD, more positive affect is also indicative of less experiential avoidance in the moment (Kashdan & Steger, 2006), leading to greater ability to engage in the full experience of a situation - creating more opportunity to experience flow.

Fewer positive emotions and more experiential avoidance are two of the biggest distinguishing features of SAD (Kashdan et al., 2013) - thus more positive affect may indicated individuals with SAD aren’t “acting” like they have SAD. While selecting to engage in more important situations may help everyone “flow hack,” increasing positive
emotions may offer a unique way for individuals with SAD to “flow hack” their daily lives.

**Limitations and Future Directions**

Despite the unique sample, method of data collection, and novel findings, several limitations warrant consideration. First, as noted in the introduction, flow is defined purely as a balance between high levels of perceived challenge and high levels of perceived performance. Although some are critical of the definition as not leading to optimal experience (e.g., Lovoll & Vitterso, 2014), the majority of flow literature uses this method, touts its benefits, and has empirically shown that this definition of flow is highly synonymous with all aspects of the flow experience (Moneta & Csikszentmihalyi, 1999). Future studies would benefit from more explicitly measuring the host of experiential variables associated with flow to support the assertion that socially anxious individuals’ social experiences are more likely to lead to optimal experiences beyond just positive affect. Moreover, the empirical measurement of the skill/challenge balance remains somewhat coarse, and it is possible that some flow experiences were inaccurately classified because of the coarse nature of this measurement. Future studies should seek to determine if alternative combinations, even if uncommon, may also prompt flow experiences - such as where an individual has extremely high skill and continuously reaps rewards from a somewhat low challenge situation.

Second, prior research suggests that attentional biases may affect flow. Individuals who are socially anxious and/or in social situations may have been affected by these biases that were not directly measured but may be inferred by some proxy
variables. A critic, in response, might argue that the omission of these potentially relevant variables outweighs the evidence of the observed effects. That argument, however, lacks the same empirical support necessary to address the primary point. In short, future correlational studies may benefit from explicitly measuring attentional bias. However, the greatest area for growth in the present research would be in implementing a more rigorous experimental design. Very few studies have experimentally manipulated flow (like in Keller & Bless, 2008). While numerous studies have manipulated attentional bias in socially anxious individuals (e.g., Gilboa-Schechtman, Foa, & Amir, 1999), none have done so while measuring experiential variables associated with varying levels of challenge in a situation.

Finally, while flow events themselves are highly pleasurable and sought after events, the current study does not address what other outcomes flow events may be related to specifically in SAD. Symptom presentations, impairment due to symptoms, and distress regarding symptoms all represent potentially useful states where flow events may be impacted and where these states impact the individuals with SAD. Future studies would benefit from including frequent measurement of flow events in lives of individuals with SAD. While ecologically valid momentary assessment presented in the present study would best capture the phenomenon of flow, even retrospective reports of the frequency of flow occurrences may yield useful and novel information on how treatment affects the entirety of a socially anxious individual’s life.

Conclusion
Attentional demands limit human experience, yet attention may also be required to reap the most optimal human experience - flow. Through examining momentary experiences in the daily lives of individuals with and without SAD, we found surprising evidence regarding differences in optimal experiences between these groups. Individuals with SAD did not differ from healthy controls in the proportion of their daily experiences that were flow experiences. This held true except that individuals with SAD experienced proportionally more flow events when in social situations than healthy controls did. Moreover, several aspects of these situations (positive affect, importance ascribed to the situation) were beneficial to increasing the chances of flow in individuals with SAD. While preliminary, this evidence suggests several avenues by which everyone may “flow hack.” Most importantly, it seems when individuals select important situations that provide a challenge, they are met with the highest chances of experiencing flow. Continuing to classify for whom and under what conditions flow is most likely, as well as explicitly manipulating those conditions to produce flow will help all individuals, both with and without positivity deficits, to reap as many experiential benefits from our environment as possible.
REFERENCES


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BIOGRAPHY

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