Is Everything Really Okay?: Anxious Reassurance Seeking as a Predictor of Stress
Generation

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor of Philosophy in the Department of
Psychology and Neuroscience in the Graduate School
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ABSTRACT

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Abstract

Stress generation theory suggests that depressed individuals experience more life stressors than non-depressed individuals, particularly dependent stressors, which are contingent upon individuals' behaviors and traits. Reassurance seeking, a behavior characteristic of anxiety as well as depression, has consistently been found to be associated with stress generation (Liu & Alloy, 2010). Until now, reassurance seeking has been studied a predictor of life stressors primarily in the context of depression. The current study sought to investigate the role of anxious reassurance seeking in stress generation.

This study evaluated the following aims: (1) Are state and trait anxiety and intolerance of uncertainty associated with reassurance seeking? (2) Is reassurance seeking associated with negative life events (stressors)? (3) Does gender moderate the relation between reassurance seeking and interpersonal stressors?

A cross-sectional and ecological momentary assessment (EMA) design was used in a sample of $N = 105$ university-affiliated participants, aged 18 – 30. Participants completed cross-sectional measures of trait anxiety, depression, intolerance of uncertainty, and global reassurance seeking. The EMA study assessed momentary positive and negative affect, daily reassurance seeking, and life events.

Multivariable regression analyses were used to evaluate the cross-sectional data. Intolerance of uncertainty and trait anxiety were significant predictors of reassurance seeking ($ps < .0001$) when controlling for depression. When all three variables were

entered simultaneously, intolerance of uncertainty ($p < .0001$), but not trait anxiety or depression, remained a significant predictor of global reassurance seeking.

Mixed effects multi-level regression models were used to consider longitudinal relations: first, between state anxiety and daily reassurance seeking and then between daily reassurance seeking and next-day negative social events.

First, daily reassurance seeking behaviors were significantly associated with greater anxiety (p for person-level mean = .0181 and p for day-to-day variation < .0001). This finding supported the hypothesis that state anxiety would be associated with daily reassurance seeking.

In the second model, a person's mean daily reassurance seeking was associated with more negative social life events on the following day ($p < .0001$). However, a person's day-to-day variation in reassurance seeking was not significantly associated with negative social life events ($p = ns$) on the following day. This suggests that those who sought reassurance seeking more often also reported more negative life events during the 14-day period. However, these findings did not support the hypothesis of anxious reassurance seeking as a predictor of increased negative social life events. Further, the relation between daily reassurance seeking and negative social life events was not moderated by gender.

The study was innovative in its evaluation of the role of anxious reassurance seeking in stress generation using an EMA design. Limitations of the study include the use of an imprecise measurement of dependent life stressors. Future studies might

consider using increasingly innovative methods, including incorporating the gold-

standard life stress interview into an EMA design.

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Introduction

Stress generation theory (Hammen, 1991, 2006) suggests that depressed individuals experience more life stressors than non-depressed individuals, particularly dependent stressors, which may be contingent upon their behaviors, traits, and characteristics. Liu and Alloy (2010) systematically reviewed cognitive, personality, and interpersonal vulnerabilities for stress generation in depression. Upon noting that some predictors of stress generation were not exclusive to depression, and in fact were characteristic of anxiety, I conducted a systematic review of anxiety-related predictors of stress generation (Meyer & Curry, 2017), proposing both distal and proximal vulnerabilities to stress generation, such as avoidant coping and reassurance seeking. Indeed, studies have consistently found reassurance seeking to be stress generative; yet, almost all studies have investigated the behavior exclusively within the context of depression (e.g. Joiner, Alfano, & Metalsky, 1992; Stewart & Harkness, 2015).

Given that reassurance seeking is a feature of multiple anxiety disorders (e.g. Beesdo-Baum et al., 2012; Heerey & Kring, 2007), this gap provides the premise for the current study – to test anxious reassurance seeking as a predictor of stress generation. An ecological momentary assessment (EMA) design, and the accompanying multi-level analyses, allows examination of both within-person and between-person processes, including (1) whether state anxiety precipitates reassurance seeking (within-person); (2) whether individuals higher in trait anxiety are more likely to seek reassurance (between-person), and (3) whether reassurance seeking is associated with increased stressors (between-person).

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Excessive reassurance seeking is theorized as a maintenance factor for anxiety (Salkovskis, 1991) and depression (Evraire & Dozois, 2011). Therefore, a clearer understanding of the possible relations among anxiety, reassurance seeking, and stress generation allows a more multi-faceted understanding of the processes and behaviors that contribute to potentially avoidable stressful life events as well as psychopathology. Clinically, a better understanding of the relationship among these constructs allows for the development of treatments to target a potentially ineffective, and malleable behavior with implications for interpersonal relationships. By investigating behaviors that strengthen or weaken social relationships, this research can ultimately contribute to the well-being of the population under study, college-aged young adults.

Proposed Conceptualization

In the figure below, I present the hypothesized association among constructs of interest in this study. In the introduction, I first review literature on reassurance seeking and its functions and conceptualizations in anxiety and depression. I then describe research on the relations of reassurance seeking with (1) anxiety (disorders; trait anxiety; state anxiety) and (2) intolerance of uncertainty (IU), a dispositional vulnerability for anxiety disorders. Finally, I describe empirical support for reassurance seeking as a predictor of stress generation. Of note, Figure 1 includes a dotted line from IU to anxiety, indicating an empirically-supported relation (e.g. Rosser, 2019; Shihata, McEvoy, & Mullan, 2017), but not one that is investigated as an aim of the current study.
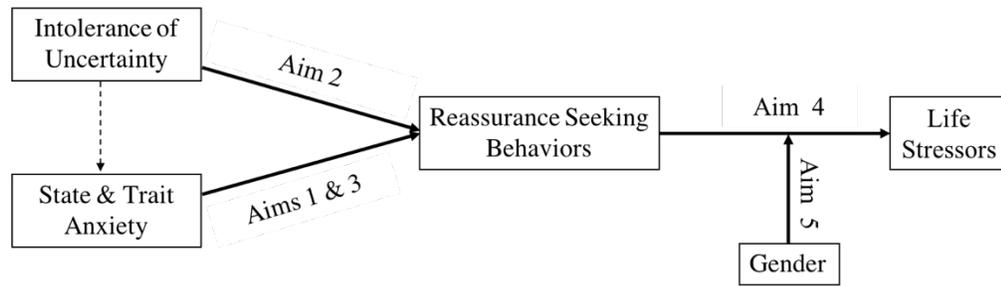
Figure 1: Hypothesized associations among constructs of interest

Reassurance Seeking

Reassurance seeking is a behavior whereby an individual makes "direct verbal requests [for] repetitive provision of old information" (Salkovskis, 1985, pp. 574–575). Reassurance seeking has been studied with regards to a variety of content including (1) concerns about decision-making, (2) the potential for threatening outcomes, (3) security of one's attachment or relationship, and (4) negative evaluation of one's lovability, worthiness, appearance, or personality (Joiner et al., 1992; Rector, Kamkar, Cassin, Ayearst, & Laposa, 2011).

Although to some extent, reassurance seeking is effective and likely helpful in certain contexts, norms around the behavior have not been well established. Rather, researchers have tended to define, only somewhat more clearly, what is excessive. Some have defined "excessiveness" as inherent to the behavior itself – that is, continuing to seek reassurance even after assurance has been provided (Joiner, Metalsky, Katz, & Beach, 1999), whereas others suggest excessiveness of reassurance seeking is defined by its consequences – that is, in creating distress for the reassurance seeker and reassurance provider (Halldorsson & Salkovskis, 2017). In this paper, I primarily conceptualize reassurance seeking as excessive when it results in distress or difficulties. I generally

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refer to reassurance seeking rather than excessive reassurance seeking unless a link to negative consequences has been established.

Hypothesized functions. Reassurance seeking features in diverse internalizing disorders, including obsessive compulsive disorder (OCD; Kobori & Salkovskis, 2013), generalized anxiety disorder (Beesdo-Baum et al., 2012), depression (Evraire & Dozois, 2011), and personality disorders (Davila, 2001), as well as insecure attachment styles (Shaver, Schachner, & Mikulincer, 2005). In this study, I primarily consider reassurance seeking with regards to anxiety and depression, where it has been most commonly studied.

In the context of anxiety, reassurance seeking may represent an individual's attempt to allay perceived threat by increasing certainty, decreasing probability of the feared outcome (Parrish & Radomsky, 2011), or reducing perceived responsibility for harm (Salkovskis & Kobori, 2015).

Reassurance has been shown to foster immediate reductions in anxiety which are followed by increases in experienced anxiety. Salkovskis and Kobori (2015) interviewed participants with panic disorder, OCD, and healthy controls about naturalistic reassurance seeking episodes. All three groups reported reductions in anxiety immediately after receiving reassurance. Both anxious groups (with panic disorder and OCD), although not the healthy controls, also reported increased anxiety in the longer-term, which the study defined as 20 minutes or more. In another study, health anxious patients reported increases in anxiety within 24 hours after seeking reassurance (Salkovskis & Warwick, 1986). The immediate reduction in anxiety contributes to negative reinforcement of the

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behavior, despite longer-term increases in anxiety for clinically anxious individuals (Abramowitz, Schwartz, & Whiteside, 2002). Further, not only does reassurance seeking contribute to longer-term anxiety, it may often contribute to the actualization of the threat of relational concerns about which one seeks reassurance. I discuss these studies in the section on stress generation below.

Within the context of depression, reassurance seeking has been conceptualized somewhat differently, as a chronic, dispositional pattern of behavior that acts as a diathesis for depression. Joiner and Metalsky (1995) describe, based on Coyne's interpersonal theory of depression (1976), that dysphoric individuals seek reassurance that others truly care and then continue to ask repeatedly because they doubt the other's sincerity. Such repeated questioning is theorized to lead the other to become fed up with the repeated requests, and ultimately reject the reassurance seeker, which precipitates a depressive episode. Although Joiner has published extensively supporting this relation (e.g. Joiner & Metalsky, 1995; Joiner, Metalsky, et al., 1999), Coyne (Benazon & Coyne, 1999) has questioned the certainty of this link, writing, "Perhaps some particularly vulnerable persons in particularly precarious interpersonal circumstances become clinically depressed as a result of excessive reassurance-seeking, but we do not think that such processes in themselves account for many episodes of depression" (p. 280).

Thus, reassurance seeking in the context of anxiety has been investigated primarily as a discrete safety behavior, whereas reassurance seeking in the context of depression has been investigated as a chronic, predisposing trait for interpersonal stressors and ultimately depression.

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Most recently, Gillett and Mazza (2018) have integrated these diverse conceptualizations of reassurance seeking. Their integrative theory of reassurance seeking proposes two distinct functions, corresponding with functions of reassurance seeking in anxiety and depression. They suggest that the avoidant function of reassurance seeking is negatively reinforced by a decrease in anxiety, uncertainty, guilt, or other negative emotion. The evocative function, on the other hand, is when reassurance seeking is positively reinforced by the receipt of affection or attention. Their theory also allows for the behavior to be bi-functional – with joint avoidant and evocative functions. The content of reassurance seeking overlaps with function, in that seeking assurance about personal worth is typically either evocative or bifunctional, whereas content unrelated to the self (i.e. checking) typically carries an avoidant function.

Further, the authors suggest mechanisms that maintain reassurance seeking, despite its long-term ineffectiveness. First, they (and others before them; e.g. Lohr, Olatunji, & Sawchuk, 2007; Rachman, 2002) propose that reassurance seeking can function as a safety behavior. Asking others if one has made the right choice or if there is actually danger present provides a sense of safety in anxiety-provoking situations, but ultimately reduces opportunities for the individual to habituate to experienced anxiety.

Second, an individual's cognitive schemas or core beliefs may contribute to resurfacing of the same doubts. That is, if one's schemas are biased toward danger or threat, he or she may discount any reassurance provided due to incongruence between one's schema and the provided reassurance. If the schema is not modified by the provision of reassurance (which is likely), similar situations in the future will continue to

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provoke doubt, worries, and the reassurance seeking behavior. Thus, in both anxiety and depression, the individual is theorized to continue to engage in reassurance seeking, even when it is ineffective towards reducing the larger threat, effectively reducing anxiety, or ameliorating relational concerns.

Measures. Distinct conceptualizations of reassurance seeking in the depression and anxiety subfields have resulted in the development of multiple measures of the construct. Most ubiquitously-used is the four-question Excessive Reassurance Seeking Scale (ERSS) (Joiner, Metalsky, et al., 1999), which operationalizes reassurance seeking as a chronic pattern in depression and focuses in on a pattern of seeking reassurance about whether one is loveable and worthy (narrower conceptualization). When tested, most studies using this measure have concluded that reassurance seeking is associated with depression, but not anxiety (e.g. Burns, Brown, Plant, Sachs-Ericsson, & Joiner, 2006; Joiner, Metalsky, Gencoz, & Gencoz, 2001).

Other measures, such as the Reassurance Seeking Scale (RSS; Rector et al., 2011) and Threat-Related Reassurance Scale (Cougle et al., 2012) were more recently developed for the study of reassurance seeking in anxiety. These measures relate to decision-making and general threat, in addition to concerns about loveableness, and thus assess a broader array of content and concerns.

Despite distinct conceptualizations, measures of reassurance seeking nonetheless seem to be highly correlated. Joiner's four-item measure of reassurance seeking about relational concerns and Cougle and colleagues' measure concerning broader content were found to correlate significantly in a sample of undergraduate students, $r = .83$ (Cougle et

al., 2012). Thus, it may be that reassurance seeking behavior is quite similar across anxiety and depression, even with varying antecedents and conceptualizations. The finding bears further replication, particularly in populations beyond undergraduate students.

Given that reassurance seeking is an interpersonal behavior, the question is the extent to which the behavior is observable by others. If observer-reported and self-reported measures of reassurance seeking were correlated, it would lend credibility to studies that measure the behavior using self-report, such as the current one. Studies that have considered this question suggest moderate correlations between self- and other-related behaviors and some concordance between reported and observed behaviors. First, in a study of undergraduate students and their romantic partners, self- and other-reports of reassurance seeking were moderately correlated (rs ranging from 0.56 to 0.60; Shaver, et al., 2005). Second, in an experimental study of reassurance seeking, participants' self-reported reassurance seeking was correlated with selecting reassurance-seeking questions to ask their romantic partners. ($b = .17, p < .05$; Lemay & Cannon, 2012). These two studies provide moderate support for the validity of self-reported reassurance seeking and for the approach used in this study.

In summary, reassurance seeking functions to reduce anxiety initially, but is ineffective over the medium and long-term, both in reducing anxiety and risk of actual threat. The construct has been conceptualized in both narrower and broader ways, with the narrow conceptualization, which focuses on social worthiness and lovability, used primarily in depression-associated research. The broader conceptualization which

considers reassurance seeking about varied content, including general threat and decision-making, along with social threat has been primarily used in anxiety-associated research. Convergent validity was found among self-reported, other-reported, and observed reassurance seeking. I next address pertinent correlates of reassurance seeking, including anxiety and intolerance of uncertainty.

Correlates of Reassurance Seeking

Anxiety. The previous section described the hypothesized functions of reassurance seeking vis-a-vis anxiety and depression. In the following section, I review studies suggesting that anxiety diagnoses and higher trait anxiety are associated with more frequent reassurance seeking. I also review qualitative research suggesting state anxiety may precipitate reassurance seeking behavior. Given that most research on reassurance seeking and anxiety has been conducted in clinical samples, I review studies on anxiety disorders as a segue to those on trait and state anxiety.

Anxiety disorders. Empirical studies have investigated reassurance seeking behaviors in multiple anxiety disorders, despite reassurance seeking not being identified as a diagnostic criterion for any anxiety disorder in the Diagnostic and Statistical Manual of Mental Disorder, 5th ed. (DSM-5; American Psychiatric Association, 2013). Reassurance seeking was included in childhood overanxious disorder in the DSM-III (American Psychiatric Association, 1980) and DSM-III-R (American Psychiatric Association, 1987) and is commonly recognized as a feature of health anxiety and OCD.

Clinically anxious patients have been found to engage in reassurance seeking more frequently than healthy controls. In videos of five-minute interactions coded by

observers, individuals with social anxiety sought reassurance and support more frequently than non-socially anxious individuals (Heerey & Kring, 2007). Similarly, outpatients diagnosed with generalized anxiety disorder reported engaging in more reassurance seeking behaviors than healthy controls (Beesdo-Baum et al., 2012). These results were validated in a recent daily diary study, whereby adults with generalized anxiety disorder and social anxiety disorder reported significantly more reassurance seeking over a two-week period than healthy controls (Wilson, Koerner, & Antony, 2018). Finally, in a sample of adults with OCD, reassurance seeking was associated with more severe obsessions. This association with severity of obsessions led the authors to suggest that reassurance seeking serves as a coping strategy for obsessions (Starcevic et al., 2012). This idea is consistent with the notion that reassurance seeking may offer short-term relief from anxiety.

In sum, clinically anxious samples have been found to engage in reassurance seeking more frequently, compared to healthy controls and in a sample of OCD patients, reassurance seeking was associated with more severe obsessions.

Trait anxiety. In a small number of studies, trait anxiety has been associated with reassurance seeking. In two studies, undergraduates completed self-report measures of anxiety and reassurance seeking. In the first (Cougle et al., 2012), reassurance seeking was moderately and positively correlated with higher anxiety, as measured by the Beck Anxiety Inventory ($r = .55$). Additionally, in this same study, continuous (dimensional) measures of symptoms of social anxiety ($r = .48$) generalized anxiety disorder ($r = .56$), and obsessive-compulsive disorder ($r = .52$) were correlated with reassurance seeking,

even after controlling for trait anxiety and depression. In a separate sample (Lerew, Schmidt, & Jackson, 1999) of undergraduate students, reassurance seeking was significantly associated with anxiety as measured by the Beck Anxiety Inventory (r = .25), but not with the trait version of the State-Trait Anxiety Inventory (r = .07).

In a third study (Challacombe, Feldmann, Lehtonen, Craske, & Stein, 2007), first-time mothers were presented with ambiguous situations about everyday parenting situations. Participants were then queried as to how they would respond. Those who endorsed that they would seek information or reassurance from others tended to endorse higher trait anxiety, as measured by STAI-trait scores (r =.50). Altogether, studies suggest that reassurance seeking is more common in clinically anxious participants than healthy controls and further, in a small assortment of studies, is positively correlated with continuous (dimensional) measures of anxiety.

State anxiety. Thus far, I have reviewed research suggesting that those with anxiety disorders or higher trait anxiety more frequently engage in reassurance seeking. Additionally, qualitative research suggests that state experiences of anxiety may act as an immediate precipitant for reassurance seeking. Two groups of researchers have conducted qualitative interviews of participants with internalizing disorders (health anxiety and OCD), and major depressive disorder about their reassurance seeking behaviors (Halldorsson & Salkovskis, 2017; Parrish & Radomsky, 2010). Participants were asked to report on functions and antecedents of their reassurance seeking. Those diagnosed with OCD and health anxiety frequently endorsed that reassurance seeking functioned to decrease tension or anxious mood (Parrish & Radomsky, 2010). In

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corroboration, clinically anxious participants reported that excessive reassurance seeking was often a "reaction to intrusive unwanted thoughts, doubts, images, anxious feelings or body sensations which were negatively interpreted" (Halldorsson & Salkovskis, 2017, p. 629).

Further, among healthy control participants, the most often-endorsed reason for reassurance seeking was perceived social threat (35.3%), doubt regarding performance (23.5%) and anxious mood (17.6%) (Parrish & Radomsky, 2011). Together these studies suggest that perceived threat and a resulting anxious mood are some of the most common precipitants for reassurance seeking in both clinically anxious and healthy adults. However, quantitative studies that measure state anxiety and reassurance seeking contemporaneously are needed to validate the association between increased state anxiety and reassurance seeking behaviors.

Intolerance of uncertainty. Intolerance of uncertainty (IU) is a future-oriented dispositional characteristic resulting from negative beliefs about uncertainty and its implications (Dugas & Robichaud, 2006). IU is associated with both anxiety and reassurance seeking and thus consideration of these relations provides another lens through which to understand reassurance seeking. I review the evidence below.

Although the concept of IU was generated out of work on generalized anxiety disorder, it is increasingly conceptualized as a transdiagnostic vulnerability that elevates risk for multiple emotional disorders, consistent with Barlow's triple vulnerability theory (2000). A rapidly-expanding literature links IU to diverse anxiety disorders as well as depression (Rosser, 2019; Shihata et al., 2017). For example, in a sample of adults

recruited for a longitudinal study on coping with loss, IU accounted for a significant amount of the variance in social anxiety, even when controlling for fear of negative evaluation and neuroticism (4.9% of the variance, over and above the other variables just mentioned) (Boelen & Reijntjes, 2009).

Further, theoretical and preliminary empirical studies suggest that IU may be associated with reassurance seeking. In a review paper, Einstein (2014) theorized that when faced with uncertainty, individuals with high IU may engage in ineffective behaviors, including reassurance seeking, avoidance, and rumination, to attempt to reduce physiological arousal associated with uncertainty. Similarly, Evraire and Dozois (2011) hypothesize that individuals with higher IU likely experience increased anxiety and threats to self-esteem, stemming from enhanced awareness of threat. They suggest that individuals high in IU may engage in reassurance seeking to reduce "uncertainty, distress, accompanying anxiety and lower self-esteem" (p. 1294). Thus, it seems that individuals with high IU both believe that life is better when there is no uncertainty and tend to experience somatic arousal when faced with uncertainty. Qualitative interviews with OCD patients confirm these processes. Patients with OCD have described engaging in excessive reassurance seeking in an attempt to achieve complete certainty (Halldorsson & Salkovskis, 2017).

In corroboration, in a cross-sectional survey of undergraduate students, IU was significantly associated with reassurance seeking, even when controlling for anxiety and depression (ERSS: *pr* =.27; TRSS: *pr* =.35) (Cougle et al., 2012). Second, in an experimental study, when researchers intentionally manipulated participants' state levels

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of IU, urges to seek reassurance were associated with conditions of high threat or ambiguity. In the experimental paradigm, undergraduate participants read vignettes that manipulated the degree of threat and ambiguity of feedback. In conditions of high ambiguity or high threat, individuals reported greater urges to seek reassurance, compared to conditions of low ambiguity or low threat (Parrish & Radomsky, 2011). This study suggests conditions under which reassurance seeking may be more likely, adding to existing knowledge of IU.

Reassurance Seeking and Stress Generation

Earlier sections briefly described potential negative outcomes associated with reassurance seeking, including maintenance of anxiety and increased likelihood of interpersonal rejection. Next, I expand the discussion and review literature in support of reassurance seeking as a mechanism of stress generation. As noted earlier, stress generation is a process whereby an individual experiences more dependent, but not more independent stressors. Dependent stressors are those that result, at least partially from the person's characteristics, or situation and may include interpersonal conflict (e.g. divorce), intentional acts by the participant (e.g. quitting a job), as well as probable involvement by the participant (e.g. being fired due to poor performance). Although this distinction between dependent and independent stressors is key, many studies may not distinguish between dependent and independent events. In a systematic review, Liu and Alloy (2010) found significant support for both symptoms of depression and depressogenic risk factors (e.g. past stressors; negative cognitive styles) as predictors of stress generation.

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Before reviewing the literature on stress generation, I will briefly discuss studies investigating the affective experiences of others in response to reassurance seeking, as it may act as the prelude to interpersonal stress generation. Most research on this topic has been conducted with individuals and their romantic partners. Swann and Bosson (1999) posited that excessive reassurance seeking, especially when reassurance is not received and incorporated by the reassurance seeker, "threatens their partners' fundamental beliefs about who they are." In this way, the partners, who provide reassurance, "learn they cannot do anything to change the way the depressed person views themselves" (p. 303), which leads to frustration and self-doubt. Experimental studies of depressive-type reassurance seeking have suggested that partners of reassurance seekers become more negative when they attempt to regulate thoughts and feelings of the reassurance seeker (Lemay & Cannon, 2012). Further, they proposed that reassurance seekers may "behave in ways that ultimately and subjectively invalidate the partner's expressions of positive regard and foster perceptions of negative regard … even in the presence of contradictory evidence" (Lemay & Clark, 2008, p. 436).

Anxious reassurance seeking, though, has only begun to be investigated this way. First, in coded five-minute interactions with socially anxious individuals, reassurance seeking was negatively correlated with the partner's positive affect and perception of the quality of the interaction (Heerey & Kring, 2007). Second, around half of participants with OCD and major depressive disorder reported that they desisted in reassurance seeking due to interpersonal concerns, particularly concern about possible rejection or the others becoming fed up or angry (Parrish & Radomsky, 2010). Third, caretakers of

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individuals with OCD report that excessive reassurance seeking has negatively impacted their relationship with the reassurance seeker. Prominent affective experiences included anger, disappointment, and particularly frustration (Halldorsson, Salkovskis, Kobori, & Pagdin, 2016). These studies all concern relationships with clinically anxious individuals. Other studies suggest, though, that reassurance seeking negatively impacts social relationships in non-clinical samples.

A recent meta-analysis found a small but significant relation between reassurance seeking and rejection, with an effect size of 0.14 (Starr & Davila, 2008). In the study, rejection was operationalized as decreased willingness to interact, decreased relationship satisfaction, or actual rejection. Additionally, in a systematic review on anxiety-associated stress generation, eight of the nine studies of reassurance seeking found that reassurance seeking was associated with increased life stressors (Meyer & Curry, 2017). The review included an innovative study by Stewart and Harkness (2015) who conducted a longitudinal study of reassurance seeking and college-aged romantic relationships. The researchers measured the actual length of the romantic relationship and asked who initiated the dissolution of the relationship. Survival analyses found that women who engaged in high levels of reassurance seeking experienced more rapid partner-initiated dissolution of the relationship. Time-to-partner-initiated dissolution was not moderated by the woman's reported dysphoria at baseline, though. Also included in the review was a study by Eberhart and Hammen (2009) who found that for young adults involved in romantic relationships, reassurance seeking significantly predicted 7% of the variance in conflict stress generation across four weeks, even when controlling for depression scores.

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Altogether, a moderate amount of research suggests that reassurance seeking is associated with increased occurrence of dependent stressors and further, that the relationship may not be moderated by the extent of depressive symptoms.

Even as multiple studies have found that reassurance seeking is associated with stress generation, some have questioned whether the behavior is as "toxic" as suggested and particularly whether reassurance seeking may function as a proxy behavior for distorted cognitions or attachment systems. Critiques have been raised about why and how reassurance seeking might be associated with increased life stressors, and particularly about broader traits/characteristics that have not typically been measured. In responses to Joiner, Metalsky, et al. (1999), various researchers suggested that the relation between excessive reassurance seeking and depression is attributable to a third, inter-related factor, including personality traits (e.g. dependency; fear of negative evaluation; i.e. McClintock, McCarrick, & Anderson, 2014), personality disorders, and pre-occupied attachment patterns (Brennan & Carnelley, 1999; Davila, 1999).

Given these speculations, the question remains open about the unique contribution of reassurance seeking to stressful life events, and if such a contribution exists, under which circumstances, or for which individuals, reassurance seeking is associated with negative outcomes. One commonly-tested variable is the gender of the reassurance seeker, given greater prevalence of anxiety and depression in women and differing norms of communication across genders. Reassurance seeking seems to be more common among women (Knobloch, Knobloch-Fedders, & Durbin, 2011; Shih & Auerbach, 2010). It could follow that because women engage in a higher frequency of reassurance seeking,

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then stress generation among women would, of course, be greater. In a daily diary study of reassurance seeking, Shih and Auerbach (2010) found that reassurance seeking was associated with more dependent stressful life events in women, but not in men.

One could also raise the alternative viewpoint, that because women more frequently seek reassurance, reassurance seeking by men may be less tolerated in close relationships. To support this assertion, in a study of college roommates, the combination of negative feedback seeking, high reassurance seeking, and depression predicted rejection by roommates for college-aged men, but not for college-aged women (Joiner & Metalsky, 1995). Thus, gender as a moderator of the relation between reassurance seeking and stress generation remains a question open for further research.

Advantages of Ecological Momentary Assessment

As described earlier, the current study used an ecological momentary assessment (EMA approach. The EMA design involves repeated sampling of participants' affect and behavior in real-time in their natural environment (Shiffman, Stone, & Hufford, 2008). This method has been used in multiple studies of reassurance seeking (Eberhart & Hammen, 2009; Raposa & Hammen, 2018; Shaver et al., 2005) and stress generation. Specifically, EMA designs and analysis using multi-level modeling allow for temporal sequencing of events and consideration of both between-person differences (trait anxiety) and within-person processes (state anxiety). I have provided evidence that global reassurance seeking is associated with higher trait anxiety (Challacombe et al., 2007; Cougle et al., 2012; Lerew et al., 1999) and that state anxiety may act as a proximal antecedent of reassurance seeking (Halldorsson & Salkovskis, 2017; Parrish &

Radomsky, 2010). By examining global and daily reports of reassurance seeking, and measuring trait and state experiences of anxiety, and stressful life events, I can begin to evaluate first, whether anxiety and intolerance of uncertainty are associated with reassurance seeking and second, whether this reassurance seeking is associated with increased experience of life stressors, even when controlling for depressive symptoms. This method best allows me to consider the research questions and aims outlined below.

Overview of the Current Study

Although theoretical sources suggest reassurance seeking as a proximal mechanism of stress generation (Meyer & Curry, 2017), to my knowledge, no empirical study has investigated the complete pathway from anxiety to reassurance seeking to stress generation, which is the purpose of the current study. The state of the literature raises three questions. (1) Are anxiety and intolerance of uncertainty associated with reassurance seeking? (2) Is reassurance seeking associated with negative life events (stressors)? (3) Does gender moderate the relation between reassurance seeking and interpersonal stressors? These questions are elaborated in the five aims identified in Figure 1 and the text below. Of note, I use the phrase "global reassurance seeking" to refer to the measure administered at baseline and "daily" reassurance seeking behaviors to refer to measures collected daily from the 14-day longitudinal study period. Similarly, I use the term, "trait anxiety" for measures derived from the baseline measure of anxiety, and "state anxiety" to refer to measures administered repeatedly during the 14-day longitudinal study period.

Aims

Aims 1 and 2 refer to cross-sectional analyses; Aims 3 to 5 refer to analyses of data collected longitudinally using the EMA design.

Aim 1. Evaluate whether trait anxiety is associated with global reassurance seeking behaviors.

Hypothesis 1. Trait anxiety and global reassurance seeking behaviors will be associated significantly with each other.

Aim 2. Evaluate whether intolerance of uncertainty is associated with global reassurance seeking behaviors.

Hypothesis 2. Intolerance of uncertainty will be significantly associated with reassurance seeking behaviors.

Aim 3. Evaluate whether higher state anxiety is associated with daily reassurance seeking behaviors.

Hypothesis 3. Higher state anxiety will be significantly associated with daily reassurance seeking behaviors.

Aim 4. Evaluate whether daily reassurance seeking behaviors are associated with stress generation.

Hypothesis 4. Daily reassurance seeking behaviors will be associated with an increased occurrence of negative life events.

Aim 5 (exploratory). Evaluate whether the relation between reassurance seeking and stress generation is moderated by the gender of the reassurance-seeking person.

Method

This ecological momentary assessment (EMA) study assessed daily positive and negative affect, reassurance seeking, and stressful life events in a sample of individuals aged 18 to 30. Study procedures were approved by the Duke University Campus Institutional Review Board. The Method and Results sections are intended to comply with reporting guidelines for EMA studies (Liao, Skelton, Dunton, & Bruening, 2016; Stone & Shiffman, 2002).

Sample

This study sought to enroll a sample of young adults with varying levels of anxiety and reassurance seeking. Eligible participants were (a) between ages 18 and 30, (b) with access to either an Android or iOS device; they must have endorsed willingness to (c) complete brief surveys four times daily across 14 days and (d) share a Google mail (Gmail) address with the researcher. Participants were excluded from the study if they did not meet one or more of the above criteria.

Participants were recruited by two means: first, the Duke University Psychology Department subject pool and second, electronic flyers posted to an online message board restricted to individuals affiliated with Duke University. Thus, eligible populations were students enrolled in certain introductory Psychology Department classes and/or were Duke-affiliated.

Power analysis. The target sample of 100 participants was determined from a power analysis using PASS (NCSS LLC., Kaysville, Utah). The sample size was estimated to provide at least 80% statistical power to address the primary aims (Aims 1-

4) and also was expected to provide sufficient heterogeneity to obtain reliable estimates of effect sizes for the exploratory Aim 5. The sample size calculations were based on the following assumptions: (a) application of multi-level random coefficients regression model for intensive longitudinal data; (b) two-tailed statistical tests with the level of significance set at 0.05; and (c) medium effects (Cohen d equivalent of 0.50). The power calculation assumed an unstructured within-person correlation pattern for analyses examining the rate and pattern of change over time.

Sample specifications. To provide adequate power to achieve the study aims, the sample was specified along two dimensions: level of reassurance seeking and gender. First, those who more frequently seek reassurance were oversampled ($n = 60$ of $N = 105$ participants). Status as a low or high reassurance seeker was determined by his or her score on the baseline measure, the Reassurance Seeking Scale (RSS). Second, within the reassurance-seeking groups, the study sought balanced proportions of males and females, with no more than 60% of either gender in either group. The targeted and achieved sample specifications are displayed in Table 1.

Table 1: Targeted versus Achieved Participant Accrual

Gender	Target Accrual			Achieved Accrual		
	Low RSS Group *n* (%)	High RSS Group *n* (%)	Total *n* (%)	Low RSS Group *n* (%)	High RSS group *n* (%)	Total *n* (%)
Males	16 – 24 (40-60%)	24 - 36 (40-60%)	40 – 60 (40-60%)	17 (37.8%)	19 (31.7%)	36 (34.3%)
Females	16 – 24 (40-60%)	24 - 36 (40-60%)	40 – 60 (40-60%)	28 (62.2%)	41 (68.3%)	69 (65.7%)
Total	40	60	100	45	60	105

Measures

Table 2 provides the administration timepoints of each measure. The text and scoring for the measures can be found in Appendix A.

Baseline measures. At the study baseline, participants completed five self-report measures, one of which was also used for screening.

Demographics. The demographics measure collected basic information, including contact details, age, gender, race and ethnicity, religion, and romantic relationship status.

Reassurance seeking scale (RSS; Rector et al., 2011). The Reassurance Seeking Scale (RSS) is a 30-item self-report scale that assesses reassurance seeking in diverse situations. For example, one question asks, "Please indicate how frequently you find yourself seeking reassurance …before exploring something new." Three subscales, (a) Decision Making (13 items), (b) Social Attachment (8 items), and (c) General Threat (9 items), comprise the measure. Scale items are measured on a five-point Likert scale, ranging from 1 (Not at all) to 5 (Extremely). Higher scores indicate more frequent reassurance seeking. The RSS has been found to have good internal consistency (αs for subscales ranged from .88 to .93; Rector et al., 2011). This measure was administered during screening and at study baseline.

Intolerance of uncertainty index (IUI; Carleton, Norton, & Asmundson, 2007). This 12-item scale assesses intolerance of uncertainty and is an abbreviated version of the original 27-item scale. It consists of two factors: prospective anxiety and inhibitory anxiety. An example item from the prospective anxiety scale is: "A small, unforeseen event can spoil everything, even with the best of planning." An example of an item from

the inhibitory anxiety scale is: "I must get away from all uncertain situations." Each item is rated on a five-point Likert scale, ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The IUI has been found to have excellent internal consistency reliability ($\alpha = .81$) and correlated well with the 27-item original scale ($r = .96$; Carleton et al., 2007).

Patient health questionnaire-8 (PHQ-8; Kroenke et al., 2009).The PHQ-8 is an eight-item measure of depressive symptoms that asks individuals to respond to the extent to which they have been bothered by any of a list of problems over the last two weeks. Answers are rated on a four-point scale, ranging from 0 to 3 (not at all to nearly every day). The eight-item version is identical to the more widely-used nine-item version, minus the question assessing suicidal ideation. The authors of the scale have noted that the omission of the question assessing suicidal ideation may be helpful in contexts where the risk of serious suicidal ideation is likely extremely low or it is not possible to further probe about a participant's endorsement of suicidal ideation, as in this research study (Kroenke & Spitzer, 2002). The PHQ-8 has been shown to have good internal consistency (Cronbach $\alpha =.89$) (Martin, Rief, Klaiberg, & Braehler, 2006) as well as high specificity and sensitivity.

Generalized anxiety disorder – 7-item scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 is a seven-item self-report scale that assesses symptoms of generalized anxiety disorder. The measure asks the extent to which individuals have been bothered by any of a list of problems over the last two weeks. Participants respond on a four-point scale from 0 to 3 (not at all to nearly every day). It has been shown to have

good reliability, criterion and construct validity, sensitivity, specificity and internal consistency (Cronbach alpha =.92; Spitzer et al., 2006).

Daily measures. Daily measures are those that were administered at least once a day over the 14-day EMA study period.

Positive and negative affect schedule – expanded form (Watson & Clark, 1994). The PANAS-X (hereafter referred to as "PANAS") is a 60-item scale of feeling and emotion adjectives that are ranked on a five-point scale (1 = Very Slightly or Not at All to 5 = Extremely). Participants are asked to indicate the extent to which they feel that way at the time. The PANAS was administered four times each day. The full instrument yields eleven lower-order (e.g. guilt, attentiveness) and two higher-order scales (i.e. positive affect; negative affect). A subset of the full measure was used, including one higher-order scale for positive affect (five items) and two lower-order scales for negative affect: fear (six items) and sadness (five items). The entire list of adjectives comprising the scales can be found in Appendix A. All three scales have previously been shown to have good internal consistency (Cronbach α for fear = .87, Cronbach α for sadness = .86; Cronbach α for positive affect = .88). Further, the scales have good construct and discriminant validity (Watson & Clark, 1994).

Daily reassurance seeking behavior. At the end of each day, participants were asked to complete a short questionnaire regarding their reassurance seeking behavior on that day. This measure adapted three questions from the Reassurance Seeking Scale (Rector et al., 2011), addressing (a) decision making (i.e. "How many times today did you seek reassurance prior to making a decision or about a decision you have already

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made?"), (b) social attachment (i.e. "How many times today did you seek reassurance about whether you are loved or cared for?") and (c) general threat (i.e. "How many times today did you seek reassurance about whether something bad will happen to you?"). Participants reported whether they engaged in that behavior during the day (yes or no). If participants endorsed the behavior, they were then prompted to enter the frequency of the behavior. The variable of interest was the sum of reassurance seeking instances (collapsed across the three subscales) on a given day. This strategy of adapting an existing questionnaire to a shorter, daily timeframe was used in previous EMA studies of stress generation (Eberhart & Hammen, 2009; Raposa & Hammen, 2018).

Modified daily events survey (Nezlek & Gable, 2001). The modified daily events survey is a list of 26 events common in the lives of university students. The questionnaire is organized into two scales of positive and two scales of negative valence: negative achievement events (six items), positive achievement events (seven items), negative social events (six items), and positive social events (seven items). Participants responded to the scale using a six-point scale, with 0 indicating that the event did not occur, and then rating every event that did occur from 1 (the event occurred, and not very meaningful) to 5 (the event occurred, and very meaningful). This scale is not expected to be internally consistent. This scale was used in a previous daily diary study of college students (Farmer & Kashdan, 2015). The variable of interest derived from this measure was the sum of occurrences of negative social events for each day. The choice of this count measure was to avoid confounding occurrence of the event with interpretation biases (as indicated by ratings of importance). Due to experimenter error, one item on the

negative social events scale was omitted from the measure for the majority of participants ($n = 69$ of $N = 105$). All analyses were conducted with the five-item outcome measure to maintain consistency in the outcome measure.

Table 2: Study measures and administration timepoints

Measure	Construct	Variable Type	Administration Timepoint(s)
Demographics		Moderator (Gender)	Baseline
Reassurance Seeking Scale (RSS)	Global Reassurance Seeking	Predictor	Baseline
Intolerance of Uncertainty Index (IUI)	Trait Intolerance of Uncertainty	Predictor	Baseline
Patient Health Questionnaire-8 (PHQ-8)	Global Depressive Symptoms	Covariate	Baseline
Generalized Anxiety Disorder – 7-item scale (GAD-7)	Trait Anxiety	Predictor	Baseline
Positive and Negative Affect Schedule-Expanded Form PANAS-X)	Daily Anxiety & Daily Depression	Predictor	Daily (Three times) Nightly (Once)
Daily Reassurance Seeking	Daily Reassurance Seeking	Outcome for Aims 1-3; Predictor for Aims 4-5	Nightly (Once)
Daily Events Survey	Daily Stressful Life Events	Outcome	Nightly (Once)

Procedure

RSS population median. The median score on the Reassurance Seeking Scale

(RSS; Rector et al., 2011) in an undergraduate population was determined by

administering the measure to all students 18 years of age or older enrolled in introductory

psychology classes during the Spring 2018 semester who agreed to participate in the Duke University Psychology Department Subject Pool ($N = 310$). Undergraduate students could opt out of subject pool involvement by writing a critical review of research articles of their choice.

Data collection to determine population RSS median overlapped in time with recruitment for the study (Spring 2018), and as a result, 20 participants from the current study also may have contributed data to determine the population median. The median score was determined at the end of Spring 2018, i.e. after data collection began, but before recruitment was limited to particular reassurance seeking groups. Thus, the scores of participants whose data contributed to determining the population median did not also determine their eligibility. Participants whose scores may have contributed to the population median were re-administered the measure at baseline.

Data were retained from participants ($N = 302$) who responded to at least 25 of the 30 questions on the measure (83.3% of the questions; i.e. did not select "prefer not to answer" on more than 5 of twenty-five questions). Missing data were imputed using multiple imputations (MICE package in R). From these scale scores, the median sum score was calculated and used to establish the cut-point in the current study of those classified in the low versus high RSS group.

Recruitment and screening. All study recruitment occurred between March 2018 and January 2019. Participants were recruited from the two sources previously identified (1) the Duke University Department of Psychology & Neuroscience Subject Pool and (2) an electronic message board. Screening and recruitment were conducted in stages to

achieve a sample that had disproportionately more participants from the high RSS group and was balanced by gender. During the screening period, participants completed the RSS in an online survey to determine their eligibility for participation in the study. If eligible, potential participants were a) either shown the current study as one possible way of earning subject pool credit (subject pool participants) or b) notified that they were eligible for the study and invited to schedule a baseline appointment (non-subject pool participants).

Of note, the study initially was open to all those who met the inclusion criteria, regardless of gender or RSS group (low or high). As target frequencies for particular cells (gender × reassurance seeking group) were reached, enrollment became increasingly limited (i.e. to those who scored above the median of the screening measure and/or who were male). Although most participants completed the RSS twice, once at screening and again at study baseline, the baseline administration functioned as the index score. That is, RSS group was assigned by score at the baseline administration.

Baseline procedures. Once eligibility criteria were confirmed, participants were invited to meet in-person with the researcher in an on-campus office for the study baseline. At baseline, participants completed five measures: (1) Demographics & identifying information, (2) Reassurance Seeking Scale, (3) Intolerance of Uncertainty Index, (4) PHQ-8, and (5) GAD-7. The 14-day study period began either on the day of the baseline assessment, or on the subsequent day, if the assessment occurred after approximately noon. At least three more prompts on the day of baseline were required for the EMA study period to begin on the same day.

Training. At the time of the baseline, participants were provided instructions to download the free application to their mobile device and instructed about how to self-initiate surveys, if necessary. Further, participants were provided written instructions about the schedule of the survey prompts, expected timeliness of response to prompts, and contact information for the experimenter. No additional training period was used in the current study.

Daily surveys. During the 14-day study period, participants completed one measure three times each day, and one survey consisting of three measures once each day, using either their mobile devices or computer (see Figure 2 below). The prompting schedule was fixed and interval-based (10 am, 2 pm, 6 pm, 9 pm), although participants were allowed to self-initiate the surveys if they anticipated being occupied at the time of the prompt. Participant recruitment occurred between March 2018 and January 2019 and thus spanned both academic terms and breaks.

The morning, afternoon and evening surveys (prompted at 10 am, 2 pm, and 6 pm), consisted only of the PANAS and assessed current affect. These were completed on a mobile app. Participants received prompts (i.e. mobile push notifications) once at each of the three timepoints to complete brief surveys regarding their current affect. Participants were previously instructed to complete each survey within a three-hour window of the prompt.

Each day at 9 pm, participants were prompted to complete the nightly survey with a personalized email message. The nightly survey consisted of three measures, assessing reassurance seeking and stressful life events throughout that day, as well as current affect

(PANAS). Participants were asked to complete the survey before they went to bed, and if that was not possible, by 10 am on the next morning. Limitations of the survey program did not allow reminders.

At the end of the 14-day study period participants were compensated, either with course research credits or money, with the amount contingent upon completion of daily surveys. Participants who participated via the Psychology subject pool were compensated with up to 4.5 research credits: 0.5 credits for the baseline, .25 credits for each day they completed at least three surveys, and 0.5 research credits for the optional debriefing.

Participants who were recruited from posted advertisements received $6 for completion of the baseline measures and $2 for each subsequent day of participation. Daily participation was operationalized as completion of at least two of the four surveys. Participants who responded to at least 80% of prompts received a $6 monetary bonus, for maximum compensation of $40.

Sampling rationale. The study used a hybrid of EMA and end-of-day methods (sometimes called daily diary methods). Positive and negative affect were collected using "at this moment" instructions, whereas reassurance seeking and stressful events asked for the participants to consider the entire day. The morning, afternoon, and evening prompts sought to attain an even sampling of moments throughout the day and to make it predictably timed to decrease participants' burden and to increase signal compliance (i.e. responsiveness to prompts to complete surveys). Assessment of current affective states (anxiety; fear; positive affect) was advantageous in eliminating the need for participants to reconstruct previous minutes or hours, which can bias responses. The rationale behind

the 9 pm end-of-day survey was to allow participants to report on the entirety of their day, as has been recommended by Stone and Shiffman (2002).

Survey modalities and technology. Participants engaged with study prompts using two survey systems: PACO and Qualtrics. PACO was used for the thrice-daily administration of the PANAS (10 am, 2 pm, 6 pm). Qualtrics was used for the nightly survey (9 pm). PACO (The Personal Analytics Companion; www.pacoapp.com) is an open-source platform for behavioral research. It includes both a web interface and a mobile application, which can be operated on both Android and iOS phones. Importantly, the mobile application provided push notifications to remind participants to complete surveys multiple times a day. PACO did not require an internet connection for participants to complete the questionnaire. If no internet connection was available (either Wi-Fi or data) at the time of survey completion, data were synced once an internet connection became available.

Qualtrics has only a web interface that can be accessed using a computer or a mobile phone but did not include a mobile application with push notifications. Participants were prompted to complete the Qualtrics via a personalized email at 9 pm each night.

The joint-system (PACO and Qualtrics) approach offered several advantages. PACO was the best service for its affordability, ease of use for participants, and the ability to send push notifications to prompt study engagement, although it supported limited types of question structures and survey schedules. Qualtrics surveys, on the other hand, offered greater flexibility in question format, but required an internet connection

and did not offer a free mobile application format. Across the study period, no

technological difficulties were reported by the participants.

1 Please rate your nervousness. Not at all ○ ○ ○ ○ ○ Extremely 2 scared Not at all ○ ○ ○ ○ ○ Extremely 3 frightened Not at all ○ ○ ○ ○ ○ extremely 4 nervous Not at all ○ ○ ○ ○ ○ Extremely 5 jittery Not at all ○ ○ ○ ○ ○ Extremely 6 shaky Not at all ○ ○ ○ ○ ○ Extremely	Duke UNIVERSITY Please indicate whether this event occurred today and if it occurred, indicate its meaningfulness. did not occur / occurred-somewhat important / occurred & extremely meaningful 0 1 2 3 4 5 did poorly on schoolwork Please indicate whether this event occurred today and if it occurred, indicate its meaningfulness.
PACO: Mobile Application used for Affective surveys	Qualtrics: Mobile Application used for nightly behavioral surveys

Figure 2: Appearance of surveys to participants on mobile phone

Compliance-enhancing strategies. Given the moderately high subject burdens

involved in an EMA study and an experimenter's more limited ability to ensure

participation compared to a laboratory setting, I now describe design strategies used to

enhance participants' rates of survey participation (i.e. compliance) based on published

recommendations (Hektner, Schmidt, & Csikszentmihalyi, 2006; Heron, Everhart,

McHale, & Smyth, 2017). First, as recommended, I sought to develop a strong research

alliance with the participants about the procedures, goals, and plans for the study in order

to develop a sense of trust and collaboration. This information was reviewed during the

informed consent process. Participants were allowed to opt-in to receive a summary of study results.

Second, contingencies (payment or course credit) were linked to rates of survey participation. To earn research credits, participants recruited from the subject pool were required to respond to at least three of the four surveys each day for a 0.25 research credit. For participants compensated with gift cards, completion of at least two of four daily surveys was required for daily compensation. For the latter participants, bonus compensation was provided for responding to a certain threshold of prompts.

Third, the experimenter provided email feedback regarding individuals' participation rates at least once and up to three times per participant across the 14-day study period. These email messages emphasized how helpful the participants were through their ongoing participation and provided feedback based on the participants' compliance so far. Positive feedback was provided for consistent responses, and if the pattern of responding was inconsistent, the communication used a problem-solving approach to ensure that participants were not experiencing any technical difficulties. Next, I describe the analytic approaches to meet the cross-sectional and longitudinal aims.

Data Analytic Plan & Procedures

Data cleaning and management were conducted using the open-source software R. Inferential data analysis was conducted using the statistical software SAS, version 9.4. Non-directional tests were performed and the level of significance was set at 0.05. In

addition to statistical significance testing, effect size estimates were reported to address clinical significance and magnitude of the effect.

Sample characteristics and baseline measures. Sample characteristics included sample demographics (age, gender, race, and ethnicity). Psychological measures collected at baseline included trait anxiety (GAD-7 total score), depressive symptoms (PHQ-8 total score), intolerance of uncertainty (IUI), and global reassurance seeking behaviors (RSS total score) at study entry. Data for these measures were complete (no missing data), save one variable for a single participant, which was imputed with the individual's median response on that measure.

Pearson/Spearman correlational or point-biserial correlational analyses were conducted to examine the association among the baseline psychological measures. The association between the global reassurance seeking total score and mean daily reassurance seeking frequency was examined as a validity check of the daily measures. Independent *t*-tests were used to test for associations between categorical demographic variables (e.g., gender or racial/ethnicity) and psychological characteristics. To evaluate differences among the low and high reassurance seeking groups, the Wilcoxon Two-Sample Test was used for continuous measures and 2×2 chi-square/Fisher's Exact Test was used for categorical measures.

Cross-sectional data analysis.

Aims 1 and 2. To fulfill Aim 1, bivariate and multivariate linear regression models were used to evaluate whether baseline trait anxiety total scores were associated with global reassurance seeking behaviors. Baseline PHQ-8 total score was included as a

potential covariate and retained in the final model only if found to be a statistically

significant predictor of global reassurance seeking behaviors. Regression analyses were

conducted using PROC REG. Effect sizes were estimated using adjusted R-squared.

Partial R-squared for individual predictors in the model was calculated using Type 1 sum

of squares.

For Aim 2, the same strategy described for Aim 1 was applied, with intolerance of

uncertainty as a predictor and global reassurance seeking behaviors as the outcome.

The final analysis for these aims included all three predictor variable - intolerance

of uncertainty, trait anxiety, and depression - as simultaneous predictors of global

reassurance seeking behaviors.

Longitudinal Data Analysis. A mixed effects multi-level modeling approach was

used, given stated recommendations for analysis of daily diary and EMA data (Bolger,

Davis, & Rafaeli, 2003). This approach accommodates the unique structure of these data,

whereby collected observations (days) comprise Level 1 analysis (within-person) and the

persons comprise Level 2 analyses (between-persons). Within this modelling approach:

(a) measures are repeated within a person and, thus, are not assumed to be independent;

(b) measurements that are closer in time are likely to be more highly correlated; (c)

individuals may have varying numbers of observations. Analyses were conducted using

PROC MIXED (Aim 3) and PROC GLIMMIX (Aims 4 and 5).

Treatment of missing and extraneous data. Listwise deletion was used for missing

data on the PANAS and life event survey. All analyses used the mean PANAS values for

a given study day. That is, PANAS responses were collapsed across the day, representing one or more "at the present moment" responses.

Although high signal compliance is important to the integrity of an EMA study, a multi-level mixed effects model can accommodate a variable number of observations for each person. Thus, no observations were imputed for missed responses. The reader is referred to the signal compliance section of the results for further details related to the completeness of the data.

Participants were encouraged to complete each PANAS within three hours of the prompting time (10 am, 2 pm, 6 pm). Nonetheless, analyses did not exclude responses that occurred outside the three-hour window. For these two measures of behavioral data (daily reassurance seeking and daily life events), participants could report on either that same day (if completed at night) or on the previous day (if completed the following morning). Responses corresponding to periods outside the 14-day study period (i.e. on Day 0, or PANAS data from Day 15) were excluded from analyses.

Aim 3. To fulfill Aim 3, multi-level mixed effects models for longitudinal data were used to test whether state anxiety was associated with participants' report of daily reassurance seeking. Although the theoretically-derived question suggests anxiety as a predictor and reassurance seeking as an outcome, this model ultimately tests association. Given the structure of the reassurance seeking variable (count) and anxiety variable (continuous), the model was structured such that reassurance seeking variable was the predictor and mean daily state anxiety was the outcome. This decision allowed greater analytical and statistical flexibility.

I evaluated three models, the first a null model, with the primary goal of partitioning variance between- and within-persons. The second model included time (study day) as a predictor, in addition to the five predictors outlined in the next paragraph. The third, final, and most parsimonious, model omitted the effect of time.

Predictors included baseline RSS group, and the individual's daily reassurance seeking. Daily reassurance seeking was decomposed into two terms: (1) the mean number of reported daily behaviors across the 14-day study period (Level 2; hereafter called "mean daily RS") and (2) the deviation from that mean on any given day (Level 1; hereafter called "RS deviation"). Because some participants had a mean daily RS of 0, and the log of 0 is undefined, I added 1 to the individual's daily mean before logarithmically transforming it. This allowed for a more normal distribution of the predictor variable. RS deviation was left untransformed for ease of interpretation. This approach of using the deviation from the mean was previously used in a daily diary study of reassurance seeking and stress generation (Eberhart & Hammen, 2009). RS deviation was also interacted with RSS group to investigate whether the deviation from one's person-level mean varied by RSS group. Finally, the model covaried for baseline severity of depressive symptoms (PHQ-8 total score (Level 2 term)).

In the last steps before choosing a final model, I investigated different residual structures and chose the best one based on theoretical grounding and Akaike Information Criterion values (AIC) and Bayesian Information Criterion (BIC) values. AIC and BIC Values estimate the relative fit of statistical models, with smaller values generally indicating a better fit. Model diagnostics and testing of assumptions were evaluated in the

final model. As part of this process, seven participants were considered as potential outliers and considered for exclusion. However, their exclusion did not substantively change the results, and thus the participants' data were retained.

Aim 4. To fulfill Aim 4, a similar analytic strategy was used as in Aim 3, of a multi-level mixed effects model. Stress generation was the outcome, which was operationalized as the number of daily negative social events. This model used PROC GLIMMIX, given its ability to accommodate a Poisson distribution. A Poisson distribution was preferred given that the outcome of negative life events was a count variable and skewed.

The predictors remained the same as in Aim 3: (1) RSS group (Level 2), daily reassurance seeking, which decomposed into the two terms of (2) daily RS mean (Level 2) and (3) daily RS deviation (Level 1). The model also included (4) the cross-level interaction between RS deviation and RSS group and (5) baseline depressive symptoms (PHQ-8 total scores) as a covariate.

The multilevel model for longitudinal data was used to test whether reassurance seeking predicts the number and pattern of negative life events the following day. This one-day lag ensured that increased reassurance seeking did not follow (albeit on the same day) the negative life event. This lagged approach as has been used in models by others in the study of stress generation (Raposa & Hammen, 2018).

Aim 5. To fulfill Aim 5, multi-level models for longitudinal data tested whether gender moderates the relationship between reassurance seeking and the number of negative events the following day. An analytical strategy identical to that described in

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Aim 4 was applied, with the addition of gender and its two-way interaction with daily

mean reassurance seeking. Supplemental analyses within each gender were conducted if

there was a significant gender-by-reassurance seeking-by-time effect (indicating a

moderating effect of gender), as per guidelines recommended by Kraemer, Wilson,

Fairburn and Agras (2002).

Results

In this section, I first describe the reliability of the RSS. I then describe the sample's demographic and clinical characteristics, and my analysis of cross-sectional data, associated with Aims 1 and 2. Next, I present descriptive data regarding signal compliance in the EMA portion of the study. Finally, I present my analysis of longitudinal, EMA data Aims 3 to 5).

Reassurance Seeking Scale

The Reassurance Seeking Scale (RSS) is a 30-item questionnaire that was used to classify participants as having a lower or higher propensity towards reassurance seeking. Scores ranged from 47 to 134.

Population median. Data were collected in order to determine the RSS median in the population of Duke undergraduates over the age of 18 enrolled in an introductory psychology course ($N = 302$). Measures of central tendency produced an estimated population median of 84 ($M = 84.4$, range: 47 – 134). The median score of 84 was taken as the best available estimate of typical reassurance seeking in the population from which the study sample was drawn. Further, it was used to inform recruitment progress and classify the participants in the current study. Participants who scored 84 or higher on the were classified as being in the "high" group and those with scores of 83 or lower were classified as being in the "low" group (hereafter referred to as high and low RSS groups, respectively).

Test-retest reliability. The baseline administration of the RSS was used as the index of reassurance seeking in this study score and thus used to classify participants'

RSS group. Screening data (consisting of the RSS) were available for 92 of the $N = 105$ study participants. Among the 13 participants without screening data, 10 did not take the pre-screen questionnaire, which was not required at that time to determine study eligibility, and 3 did not consent to allow their pre-screen data to be linked with study data.

The test-retest reliability (examined using Pearson's r) between screening and baseline RSS scores was $r = .74$, which is considered a large effect size, indicating acceptable test-retest reliability. A mean of 19 days passed between screening and baseline. Next, I examined the proportion of participants who were stable (stayed within same RSS group across administrations of the RSS) or unstable (changed RSS group across administrations) in their classification. Approximately three quarters (77.2%) were stable in their classification, leaving slightly less than one quarter (22.8%) as unstable. Among those who were classified as low RSS group at prescreen ($n = 23$), two participants moved to the "high" group on the RSS (8.6%). Among those classified as in the high RSS group at baseline ($n = 71$), 19 participants shifted to the "low" group (26.7%). Internal consistency of the measure was high (Cronbach $\alpha = .926$).

Sample and Clinical Characteristics

The cross-sectional study was comprised of 105 participants (69 female; 60 from the high RSS group). Among the 105 participants, 47 were recruited from the subject pool and 58 from online advertisements. Medians, and 25th and 75th percentile scores are presented in Table 3.

No significant differences were found between high and low RSS groups on demographic characteristics, including gender, $\chi^2(1, N = 105) = 0.426, p = .5393$), racial minority $\chi^2(1, N = 105) = 0.012, p = 1.00$), student status $\chi^2(1, N = 105) = 1.452, p = .4941$), romantic relationship status $\chi^2(1, N = 105) = 1.714, p = .2335$), or age (Wilcoxon $z = 1.296, p = .1979$).

Significant differences were found between the two groups in all clinical characteristics. Participants from the high RSS group reported more symptoms of anxiety (Wilcoxon $z = -3.251, p = .0016$), more symptoms of depression (Wilcoxon $z = -3.320, p$ 0.0012, and greater intolerance of uncertainty (Wilcoxon $z = -5.042, p < .0001$) and by definition, greater global reassurance seeking (Wilcoxon $z = -8.741; p < .0001$; Table 3).

Table 3: Baseline demographic and clinical characteristics by RSS group

Characteristic / Measure	Total (*N* = 105)	Low RSS Group (*n* = 45)	High RSS Group (*n* = 60)	*p*-value of differences between groups
Female gender	69 (65.7 %)	28 (62.2 %)	41 (68.3 %)	0.5393
Racial minority	51 (49.5 %)	22 (48.9 %)	29 (50.0 %)	1.0000
Undergraduate or Graduate Student	89 (84.8 %)	39 (86.7 %)	50 (83.3 %)	0.4941
Romantic Relationship	45 (42.8 %)	16 (35.6 %)	29 (48.3 %)	.2335
Age, in years	20.0 (19.0, 23.0)	20.0 (19.0, 23.0)	20.0 (19.0, 22.0)	0.1979
RSS	87.0 (72.0, 97.0)	70.0 (63.0, 75.0)	95.0 (89.5, 105.5)	<.0001
PHQ-8	5.0 (3.0, 7.0)	3.0 (2.0, 5.0)	5.0 (4.0, 8.0)	0.0012
GAD-7	4.0 (2.0, 7.0)	4.0 (1.0, 5.0)	5.5 (3.0, 8.5)	0.0016
IUI	30.0 (26.0, 36.0)	28.0 (23.0, 30.0)	34.0 (30.0, 41.0)	<.0001

Note. Median (25th, 75th percentiles) for continuous data; *n* (%) for categorical data. P-values are derived from Wilcoxon Two-Sample Tests for continuous measures and 2 x 2 chi-square/Fisher's Exact Test for categorical measures.

Cross-sectional Aims

All variables included in Aims 1 and 2 were measured at the baseline assessment and thus represent cross-sectional data. The simple correlation matrix is presented in Table 4. Results of the regression analyses are presented in Table 5.

Aim 1: Association of trait anxiety with global reassurance seeking behaviors Aim 1 sought to identify whether trait anxiety was associated with global reassurance seeking. In the first model, anxiety (measured with the GAD-7) was entered into a regression model predicting global reassurance seeking. Consistent with results of the simple Spearman correlations, in the bivariate model, anxiety was a significant predictor of self-reported global reassurance seeking ($\beta = .489$, $p < .0001$, $R^2 = .232$).

Next, I evaluated whether anxiety remained a significant predictor when controlling for baseline depression scores. In the multivariable model with simultaneous entry, anxiety remained a significant predictor of baseline global reassurance seeking ($\beta = .399$, $p = .0016$), accounting for 7.7% of the variance, which is a small to medium effect size, compared to depression, which did not remain a significant predictor when controlling for the effects of anxiety ($\beta = .127$, $p = .3048$).

Aim 2: Association of Intolerance of Uncertainty (IU) with global reassurance seeking behaviors Aim 2 used the same strategy as Aim 1, of bivariate linear regression model followed by a multivariable linear regression model (Table 5). First, IU was entered into a bivariate regression model to predict global reassurance seeking. In the bivariate model, IU was a significant predictor of self-reported global reassurance seeking ($\beta = .636$, $p < .0001$, $R^2 = .398$).

Next, I evaluated whether IU remained a significant predictor when controlling for baseline depression scores. In the multivariable model, IU remained a significant predictor of baseline global reassurance seeking ($\beta = .562$, $p < .0001$), accounting for 26.0% of the variance in global reassurance seeking, which is considered a large effect size. Depression remained a significant predictor when controlling for the effects of IU ($\beta = .161$, $p = .0351$, $pr^2 = .026$).

In the final model, depression, anxiety, and intolerance of uncertainty were simultaneously entered in the multivariable regression model. In the full model, intolerance of uncertainty ($\beta = .528$, $p = < .0001$, $pr^2 = .186$), but not anxiety ($\beta = .098$, $p = < .4118$, $pr^2 = .004$), or depression ($\beta = .120$, $p = < .2679$, $pr^2 = .007$), remained a significant predictor of global reassurance seeking.

Together, these analyses suggest that anxiety and IU remained significant predictors of reassurance seeking when controlling for depression. When IU, anxiety, and depression were entered simultaneously into the model, only IU accounted for significant variance beyond what is explained by anxiety and depression. These findings generally supported Hypotheses 1 and 2.

Table 4: Intercorrelations among baseline measures

Measure	PHQ-8	GAD-7	IUI
RSS	0.417	0.449	0.593
PHQ-8	--	0.761	0.390
GAD-7	--	--	0.521
IUI	-	--	--

Note. All correlations presented in this table are significant at the $p < .01$ significance level. Spearman correlations were used due to skew of distributions.

Table 5: Prediction of RSS total score by anxiety and intolerance of uncertainty

Model	Predictor	Predictor	b	SE	ß	Adjusted Overall R^2	Partial R^2*	t	P
Bivariate	GAD-7	GAD-7	2.236	0.393	0.489	0.232		5.70	<.0001
Multivariable	GAD-7	GAD-7	1.821	0.562	0.399	0.233	0.077	3.24	0.0016
	PHQ-8	PHQ-8	0.633	0.614	0.127		0.008	1.03	0.3048
Bivariate	IUI	IUI	1.461	0.175	0.636	0.398		8.36	<.0001
Multivariable	IUI	IUI	1.291	0.190	0.562	0.418	0.260	6.81	<.0001
	PHQ-8	PHQ-8	0.878	0.411	0.176		0.026	2.14	0.0351
Multivariable	IUI	IUI	1.215	0.211	0.528	0.417	0.186	5.76	<.0001
	GAD-7	GAD-7	0.449	0.545	0.098		0.004	0.82	0.4118
	PHQ-8	PHQ-8	0.597	0.535	0.120		0.007	1.11	0.2679

*The Partial R^2 uses Type 1 Sum of Squares (sequential), the squared partial correlation after removing all variance accounted for by the other predictors in the model.

Description of Longitudinal Data

An examination of signal compliance and attrition informs the analysis of the longitudinal data and of potential bias in the data. In this section, I present indicators of validity of the daily-assessed (EMA) data, rates of participant attrition, and signal compliance and then (following the figures and tables), descriptive statistics related to the measures of daily anxiety and daily reassurance seeking.

Measure validity. The association between the global reassurance seeking scale (RSS) score and daily reassurance seeking measures was examined as a validity check of the daily measures. The RSS and the mean daily number of reassurance seeking behaviors were moderately to highly correlated (Spearman $r = .40$).

Participants predominantly (in 75% of behavioral responses) responded on the day about which they were reporting, rather than on the next morning. This rate suggests that the study generally achieved its goal of minimizing retrospective bias.

I also examined the internal consistency of the measures. The Cronbach Alpha on the three PANAS scales was high (.884 for fear, .899 for sadness, and .874 for positive affect), ranging from .874 to .899 for all three scales, which is consistent with previous reports by the authors of the measure (Watson & Clark, 1994). High internal consistency would not be anticipated on the other measures administered longitudinally, the Life Events Survey and Daily Reassurance Seeking Measure, given that they were essentially count reports of discrete occurrences.

Attrition. Among the 105 participants in the study, four participants dropped out, which was operationalized as ceasing response to all signals before the end of the 14-day

study period. The time of drop-out was variable, such that the last day of participation

was on Day 5 for one participant, Day 8 for two participants, and on Day 11 for the last

participant. Two of the four participants identified a reason for dropout. One reported

wanting to spend less time on her mobile device and the other reported the loss of her

mobile phone. The third did not indicate any reason for drop-out or and the last did not

notify the experimenter of her choice to stop participating.

Signal compliance. Each participant was signaled (prompted) to respond to 56

surveys during the 14-day study period. Among these 56 surveys, 14 included questions

related to daily reassurance seeking and negative life events (hereafter called behavioral

surveys or signals) and all 56 included the measure of current affect (hereafter called

affective surveys or signals). I address responsiveness (i.e. compliance) to behavioral

signals separately from affective signals, given that the behavioral surveys were

administered only once daily and asked about the entire day, whereas affective surveys

were administered four times daily and asked about emotions at the current moment. It is

important to note that the rate of affective responses is not entirely independent of the

rate of behavioral responses, given that participants completed one of the daily PANAS

ratings at the same time that they completed behavioral surveys.

Figure 3 illustrates compliance in responding to affective prompts across the

study period. Most participants on most days (range: 65% to 82%) provided three to four

indicators of their affective state throughout the day, with a significantly smaller

proportion providing one to two responses (range: 6.6% to 15.2%) or five or more

affective responses (range: 1.9% to 15.2%). Notably, a participant could validly have five

affective responses on a given day if she completed the affective and behavioral survey

the next morning about the previous night and then also responded to all signals on that

day. All participants provided at least one affective response for the first four study days.

The percentage of the sample who completed at least two affective surveys on a given

study day ranged from 91.4% (Days 11 and 12) to 100% (Day 2), with an average of

95.5% across the 14 days. The percentage of the sample who completed at least three

affective surveys on a given day ranged from 80.9% (Day 11) to 93.3% (Day 2), with an

average of 86.7% across the 14 days.

Figure 4 illustrates that the behavioral response rate was above 75% for each day

during the study. The percentage of the sample who completed the behavioral survey

ranged from 78.9% (Day 8) to 94.2% (Day 1), with an average of 87.2 %.

The average compliance rates for both the affective and behavioral responses

were above the 80% compliance rate recommended by Stone and Shiffman (2002) and

subsequently noted by Liao et al. (2016). Further, as noted in Table 6, signal compliance

did not vary by RSS group, but did vary by gender; females responded to more affective

signals than males (for females, median count = 53; for males, median count = 51) and

completed more behavioral surveys (median count for females = 13, median count for

males = 12.5; Wilcoxon z = -2.78, p = .005). The number of behavioral or affective

responses were not otherwise related to age, or baseline anxiety or depression.

Daily anxiety. When collapsed across time and person, mean anxiety was

relatively low (mean across all participants and days = 8.09, possible range: 6 to 30;

Table 7). Time was associated with reported anxiety, in that individuals reported decreasing anxiety across the 14-day study period (Figure 5, $b = -.06$, $p = .01$).

Daily reassurance seeking. Table 8 indicates that, without considering person-level correlation, participants reported engaging in any type of reassurance seeking on 52.2% of study days, with those in this high RSS group engaging in RS on 61.0% of study days and those in the low RSS group engaging in RS on 40.7% of study days. Seeking reassurance about decision-making was the most commonly-reported variety (35.3% of days), followed by seeking reassurance about being loved or cared for (27.0% of days) and finally, about whether something bad will happen (24.1% of days; Figure 6). Figure 7 indicates the count of daily reassurance seeking events across time, separated by RSS group.

The advantage of longitudinal data is the opportunity to examine differences and frequencies at the person-level, given that individuals may be more or less prone to reassurance seeking. The median person in the full sample sought reassurance on 54% of study days, with the median person in the high RSS group seeking reassurance on 64% of days, and the median person in the low RSS group seeking reassurance on 43% of days (Table 9).

Daily negative life events. In both RSS groups, and the full sample, individuals reported fewer negative events than positive events, when collapsed across person and time. Figure 8 illustrates that the median number of negative social events was most often 0 or 1, and the median stayed at zero for the second half of the study

Figure 3: Affective survey compliance by study day.
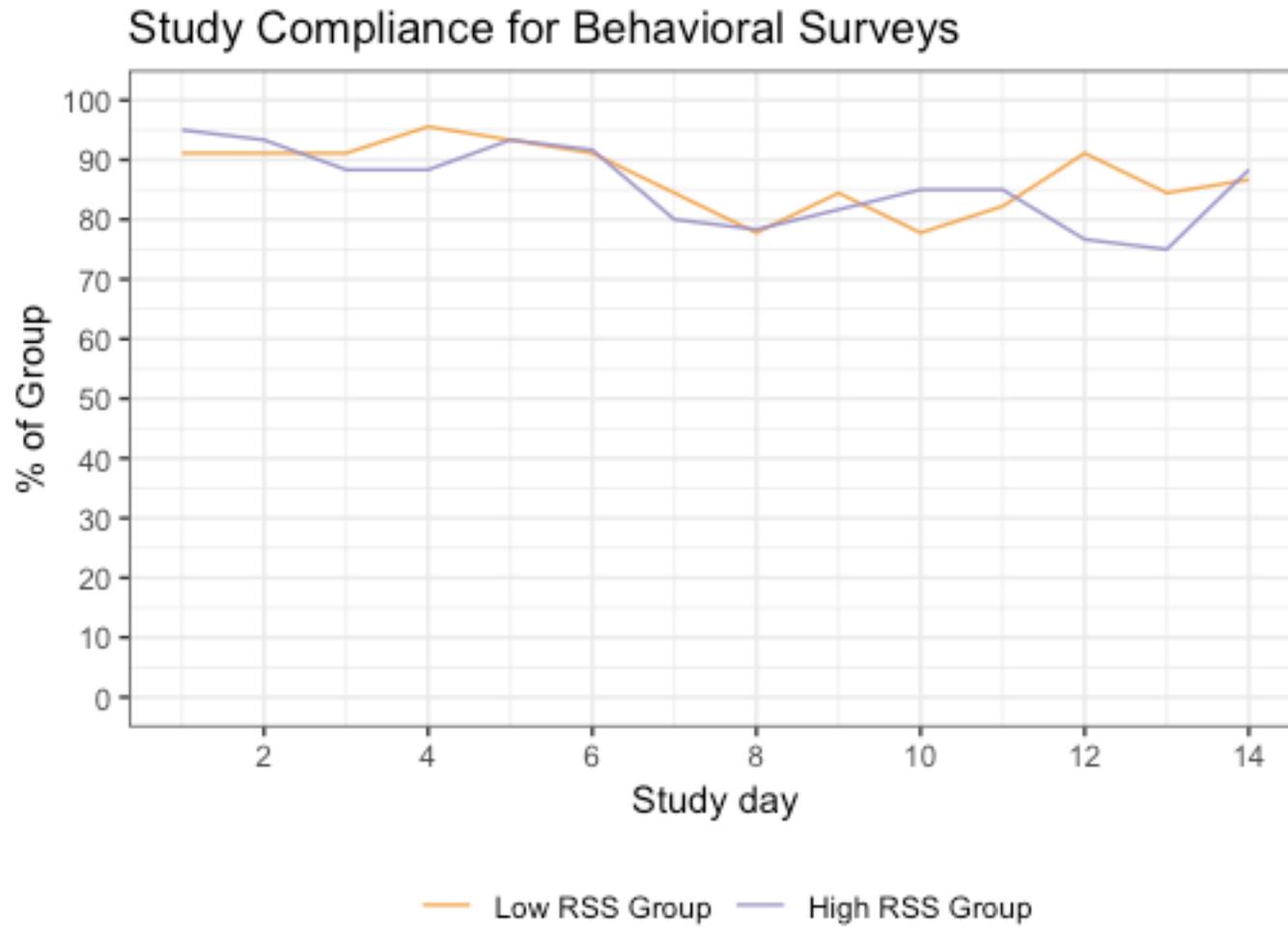
Figure 4: Behavioral survey compliance by study day

Table 6: Person-level compliance for affective and behavioral surveys

Type of Response	Person-Level Median Count (25th, 75th)		
	Total Sample N = 104	Low RSS Group n = 44	High RSS Group n = 60
Affective	53 (48, 55)	53 (49, 55)	53 (47, 54)
Behavioral	13 (12, 14)	13 (12, 14)	13 (12, 14)

Note. Affective prompts were generated four times a day (4 x 14 = maximum frequency of 56), although participants also had the option to self-initiate. Behavioral responses were completed one time for each day (possible total of 14).

Table 7: Descriptive statistics for PANAS scales, collapsed across person and time

PANAS Scale	Mean ± SD	Median	Range	Cronbach α
Fear	8.09 ± 3.32	7.00	6.0 – 30.0	.884
Sad	7.52 ± 3.65	6.00	5.0 – 25.0	.899
Positive Affect	12.15 ± 4.89	12.00	5.0 – 25.0	.874

Figure 5: Predicted anxiety scores, by RSS group across time.

Table 8: Count frequency of days (%) with reported reassurance seeking, by RSS group

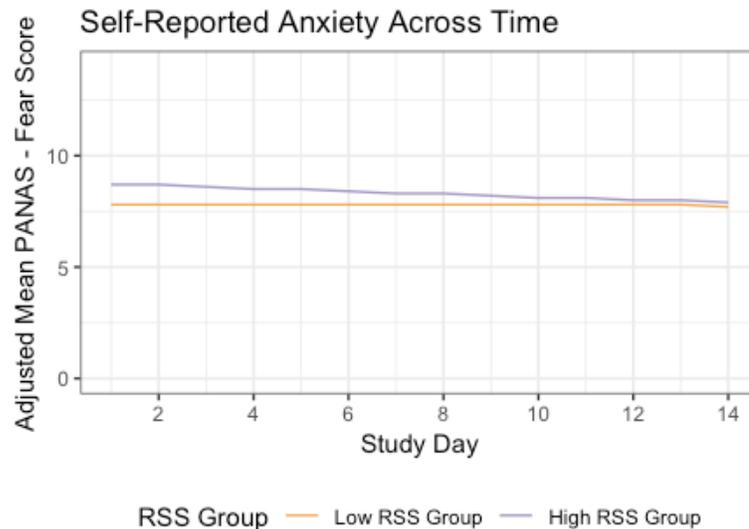| Category	Number of Days (%) Behavior Reported across 14-day study period*		
	Total (N = 104)	Low RSS Group (n = 44)	High RSS Group (n = 65)
Reassurance Seeking About Decision	450 (35.3 %)	146 (26.5%)	304 (42.0%)
Reassurance Seeking About Being Loved or Cared For	343 (27.0%)	88 (16.0%)	255 (35.4%)
Reassurance Seeking about Whether Something Bad Will Happen	307 (24.1%)	88 (15.9%)	219 (30.4%)
Reassurance Seeking of Any Type	663 (52.2%)	224 (40.7%)	439 (61.0%)

Note: Denominator of percentages vary somewhat by the completeness of the variable in the dataset. Denominators for the total sample column range from 1270 to 1275. Denominators for percentages in the Low RSS column range from 550 to 552. Denominators for percentages in the high RSS column range from 720 to 724.

Table 9: Person-level percentage of days with reported reassurance seeking, by RSS group

Category	Person-Level Median Percentage of Days (25th, 75th percentiles) Reassurance Seeking was Reported		
	Total (N = 104)	Low RSS Group (n = 44)	High RSS Group (n = 65)
Reassurance Seeking About Decision	33% (15, 50)	19% (8, 36)	42 % (25, 57)
Reassurance Seeking About Being Loved or Cared For	22% (7, 38)	8% (0, 29)	31% (8, 50)
Reassurance Seeking about Whether Something Bad Will Happen	15% (0, 36)	8% (0, 17)	23% (8, 40)
Reassurance Seeking of Any Type	54% (31, 71)	43% (20, 58)	64% (46, 78)

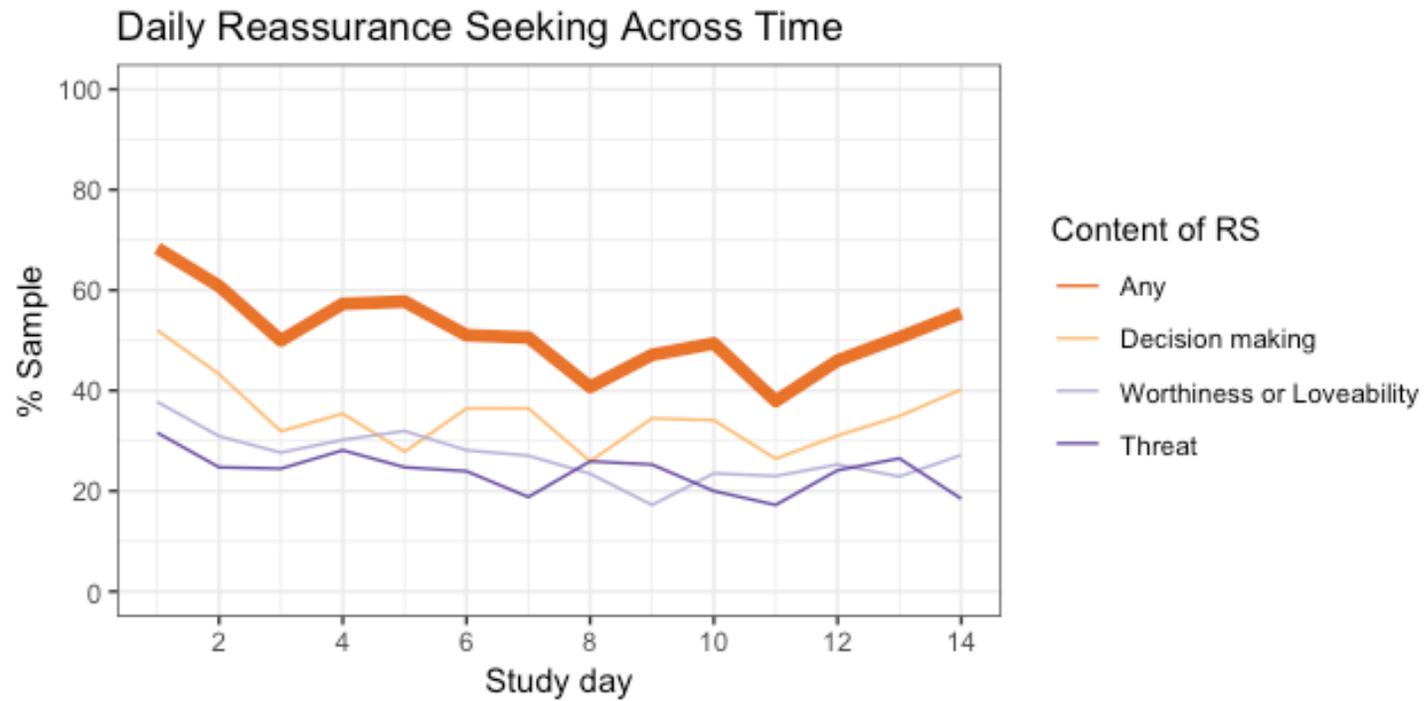**Figure 6: Daily reassurance seeking behaviors by type, across time**
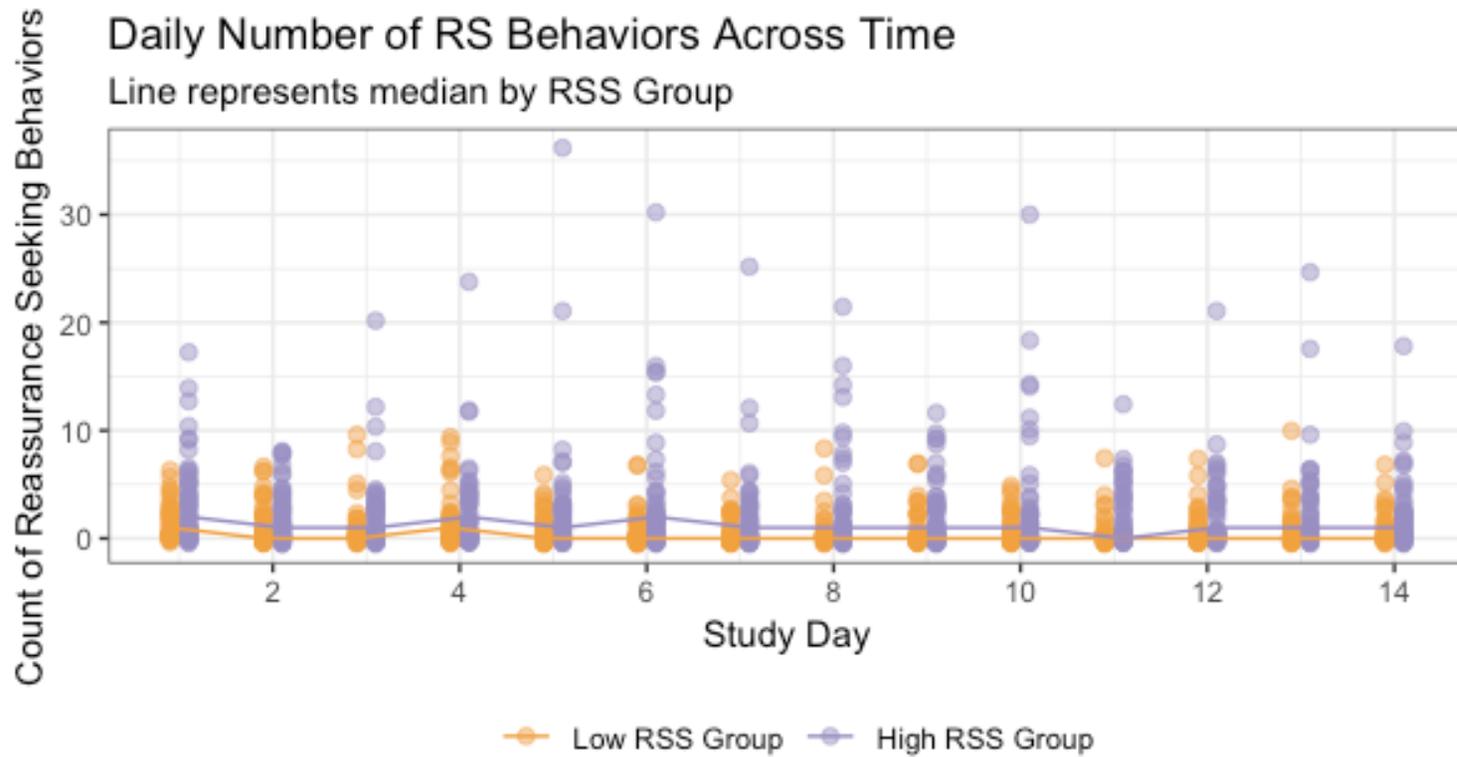
Figure 7: Median daily count of reassurance seeking behaviors across time, by RSS group
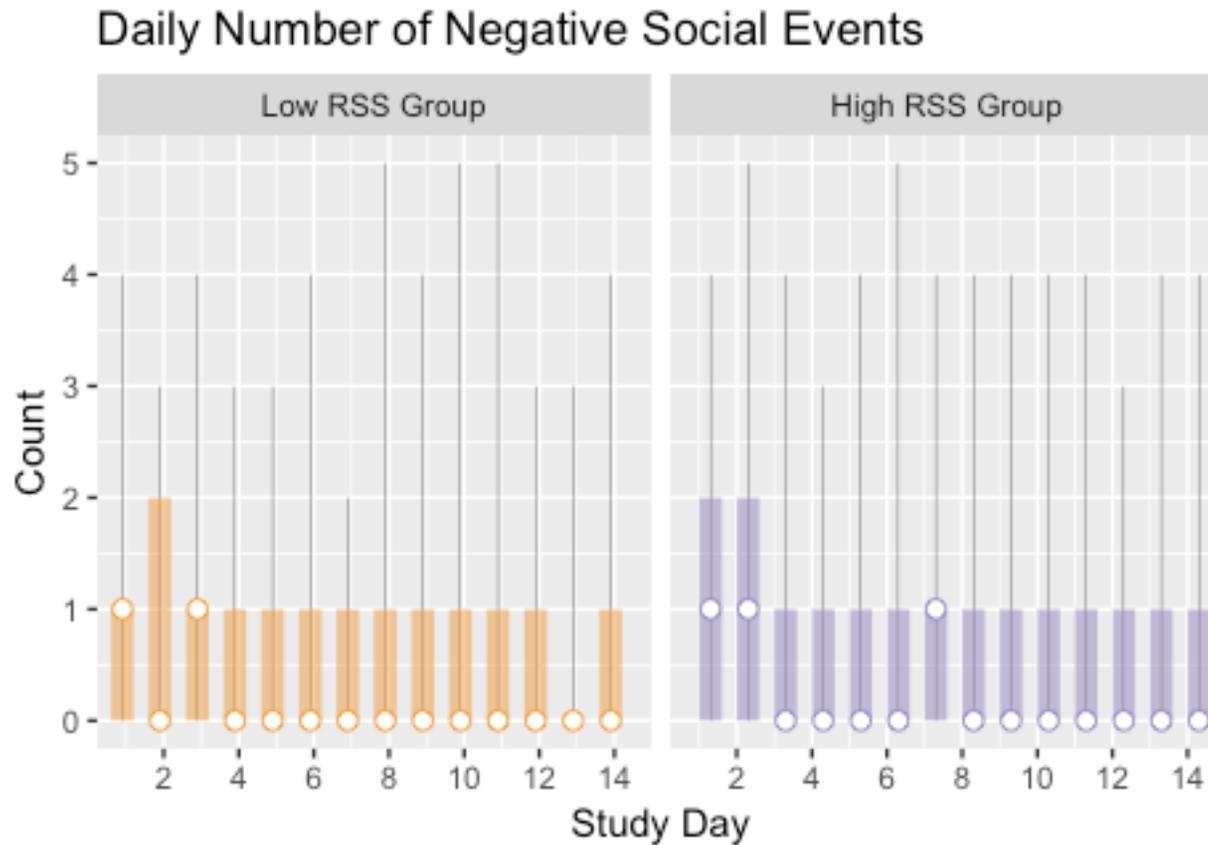
Figure 8: Median daily count of negative social events by RSS group, across time

Note. The thick colored bars indicate the 75th percentile, the thin black bars indicate the 95th percentile, and the circles indicate the median count.

Longitudinal Aims

All participants who provided data for at least one behavioral survey were

included ($n = 104$). One participant (male, from the low RSS group) was excluded from

the analysis of Aims 3 through 5 because he did not provide any responses to the nightly

behavioral survey.

Aim 3: Association between daily reassurance seeking and anxiety. First, the null

model was used to parse within-person and between-person effects. In this null model,

the intra-class correlation (ICC) indicated that 47% of the variance in anxiety was within-

person, where 53% of the variance in anxiety was due to between-person effects.

I then developed a mixed model that allowed for the effect of time by including

study day as a random slope. Given the non-substantive contribution of time and that I

had not expected the relations to vary over the study period, I ultimately opted for the

more parsimonious model that did not include an effect of time.

The final model used a first-order autoregressive structure, allowing for

correlation one observation apart (in this case, study day) in the residual terms for each

subject. This autoregressive structure was used in lieu of the assumption that residuals are

independently and normally distributed. Allowing the first-order autoregressive structure

improved model fit, as assessed by the AIC and BIC values.

Model & Annotation. The final model for Aim 3 is included below.

Level 1 Model: $\text{Anxiety}_{it} = \beta_{0i} + \beta_{1}\text{RSDeviation}_{it} + \beta_{2}(\text{RSDeviation} \times \text{RSSGroup}_i)$

$+ \text{e}_{it}$

Level 2 Model: $\beta_{0i} = \gamma_{0} + \gamma_{1}\text{RSSGroup} + \gamma_{2}\log(\text{MeanDailyRS}) + \gamma_{3}\text{PHQ} + u_i$

In the above equations, the subscript $_i$ represents varying by person (Level 2), and the subscript $_t$ represents varying across time, which is nested within person (Level 1). In the Level 1 model, anxiety for a given person on a given day is the outcome variable. The β_{0i} term indicates a random intercept for each individual. The model includes one level 1 effect (β_iRSDeviation$_{it}$), and one cross-level effect (RSDeviation$_{it}$ × RSSGroup$_i$). The error for a given person on a given day is indicated with e$_{it}$. In the Level 2 model, β_{0i} is the intercept given fixed effects, γ_0 represents the intercept for the average person, and γ_1 and γ_2 are the coefficients for the Level 2 fixed effects (RSS group and mean daily RS, respectively). Finally, u_i represents the person's deviation from the average intercept.

In the final model, both mean daily RS ($b = .758, p = .0181$), and daily RS deviation ($b = .115, p < .0001$) were associated with daily anxiety. Further, a trend-level interaction of RSS group with daily RS deviation was found ($b = -.089, p = .0940$). Baseline RSS group was not significantly associated with anxiety, however ($b = .363, p = .3315$). However, the covariate of PHQ score was significantly positively associated with anxiety ($b = .290, p < .0001$; see Table 10)

This pattern of findings suggests that daily reassurance seeking behaviors are associated with anxiety, above and beyond RSS group and depression. Further, the trend-level interaction between daily RS deviation and RSS group, suggests that deviation from an individual's mean was associated with greater anxiety for those in the high RSS group, compared to those in the low reassurance seeking group. This pattern of findings supported the hypothesis.

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Aim 4: Association between daily reassurance seeking & stress. Daily stressors are operationalized as the count of negative social life events. The generalized chi-square value for the model was non-significant, indicating no evidence of lack-of-fit.

Model & Annotation. The model estimated for Aim 4 is below.

Level 1 Model: $\text{NegativeSocialEvents}_{it} = \beta_{0i} + \beta_1 \text{RSDeviation}_{it\text{-}1} + \beta_2(\text{RSDeviation}_{it\text{-}1}$

$\times \text{RSSGroup}_i) + e_{it}$

Level 2 Model: $\beta_{0i} = \gamma_0 + \gamma_1 \text{RSSGroup} + \gamma_2 \text{PHQ} + \gamma_3 \log(\text{DailyMeanRS}_i) + u_i$

In the Level 1 model, count of negative social life events for a given person on a given day is the outcome. As in the Aim 3 model, the subscript $_i$ represents varying by person (Level 2), and the subscript $_t$ represents that the term varies across time and is nested within person (Level 1). The β_{0i} represents being an individual's random intercept. The model includes one level 1 effect ($\beta_1 \text{RSDeviation}_{it}$), one cross-level effect ($\text{RSDeviation}_{it} \times \text{RSSGroup}_i$), and the error term for a given person on a given day (e_{it}). Within the Level 2 model, β_{0i} is the intercept given fixed effects, γ_0 represents the intercept for the average person, and γ_1 and γ_2 are the coefficients for the Level 2 fixed effects - RSS group and mean daily RS, respectively. Finally, u_i represents the person's deviation from the intercept of the average person.

In this model, the Level 2 predictor, daily mean reassurance seeking, was significantly associated with negative social events ($b = .4999, p = .0003$). Deviation from mean daily reassurance seeking (Level 1) was not significantly associated with negative social events ($b = -.001, p = .9664$), nor was baseline RSS group ($b = -.192, p =$

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.2543) or the cross-level interaction between RS deviation and baseline RSS group ($b =$ .029, $p = $ .4561). However, the covariate of baseline depression score was associated with next-day negative social events ($b = $ .076, $p =$ .0005).

The pattern of findings suggests that individuals who report higher daily reassurance seeking behaviors also report more negative social life events. However, day-to-day deviations in reassurance seeking are not significantly associated with next-day negative social life events. These findings provided partial support for the hypothesis. Depressive symptoms were significantly associated with more negative social life events.

Aim 5: Moderation of stress generation by gender.   Table 10 depicts the results of the estimated model addressing this aim. In this model, gender was included in the model as a predictor, and in interaction with mean daily reassurance seeking. Although gender was a trend-level predictor of negative social life events ($b = $ .489, $p = $ .08), it was not significant in the interaction with mean daily reassurance seeking ($b = $ -.375, $p = $ .1324). This finding suggests that gender did not moderate the relation between daily reassurance seeking and negative social life event. Thus, the findings did not support Hypothesis 5.

Table 10: Multi-level Prediction of Anxiety and Negative Social Life Events by Daily Reassurance Seeking

Aim	Outcome	Parameter	b	SE	t	p
Association between state anxiety & daily reassurance seeking	Anxiety	Intercept	5.752	0.442	13.01	< .0001
		Mean Daily RS	0.758	0.316	2.40	.0181
		Daily RS Deviation	0.115	0.020	5.72	<.0001
		RSS Group	0.363	0.372	0.98	.3315
		Daily RS Deviation × RSS Group	-0.089	0.053	-1.68	.0940
		PHQ	0.290	0.053	5.65	<.0001
Association between daily reassurance seeking & negative social life events	Negative Social Events	Intercept	-1.556	0.206	-7.57	<.0001
		Mean Daily RS	0.499	0.137	3.65	0.0003
		Daily RS Deviation	-0.001	0.014	-0.04	0.9664
		RSS Group	0.192	0.168	1.14	0.2543
		Daily RS Deviation × RSS Group	0.029	0.038	0.75	0.4561
		PHQ	0.076	0.022	3.49	0.0005
Moderation by gender of the association between daily reassurance seeking & negative social life events	Negative Social Events	Intercept	-1.729	0.228	-7.57	<.0001
		Mean Daily RS	0.644	0.165	3.91	<.0001
		Daily RS Deviation	0.003	0.013	0.23	0.8165
		Gender	0.489	0.279	1.75	0.0802
		RSS Group	0.173	0.167	1.03	0.3013
		Mean Daily RS × Gender	-0.375	0.249	-1.51	0.1324
		PHQ	0.075	0.022	3.47	0.0005

Discussion

This study, conducted in a sample of university-affiliated young adults ($N = 105$), examined cross-sectional relations among trait anxiety, intolerance of uncertainty (IU) and global reassurance seeking (Aims 1 and 2). Using an EMA design ($N = 104$), I evaluated longitudinal relations between state anxiety and reassurance seeking behaviors (Aim 3) and between reassurance-seeking and negative social life events (Aim 4). Finally, I examined whether the relation between daily reassurance seeking and negative social life events was moderated by gender (Aim 5).

Cross-sectional findings: Anxiety and Intolerance of Uncertainty (IU) as Predictors of Reassurance Seeking

Using cross-sectional data, I first evaluated predictors of global reassurance seeking. In a series of multivariate regression analyses, trait anxiety (Aim 1) and IU (Aim 2) remained significant predictors of global reassurance seeking when controlling for depression. As a follow-up to the cross-sectional aims, when anxiety, depression, and intolerance of uncertainty (IU) were simultaneously entered into the model, only IU remained a significant predictor of reassurance seeking.

The results from Aim 1 support the hypotheses that, in a college-aged sample, reassurance seeking, with content inclusive of decision making, threat, and relationship concerns, continues to be associated with anxiety, even when controlling for depression. These results are consistent with those from Cougle et al. (2012), although contrary to those reported by others studying reassurance seeking as it relates to depression (Joiner, Katz, & Lew, 1999; Joiner et al., 2001). This study's measure of reassurance seeking

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aligns most closely with that used in studies investigating reassurance seeking in anxiety (e.g. Cougle et al., 2012; Helbig-Lang & Petermann, 2010; Rector et al., 2011). Thus, the findings in this study are also consistent with previous research showing that the broader conceptualization of reassurance seeking is significantly associated with anxiety.

Further, the findings for Aim 2, and its follow-up analyses are consistent with past research positing the importance of IU in reassurance seeking as well as a potentially causal role in anxiety (Boelen & Reijntjes, 2009; Rosser, 2019)

Specifically, the magnitude of the correlation coefficient for the relation between IU and reassurance seeking in this study (r = .593) was consistent with that in previous research (r = 0.61; Cougle et al., 2012). However, the current study also found that, when controlling for IU, anxiety did not uniquely account for variance in global reassurance seeking. The outsize influence of IU is discrepant from the one study that has reported on these relations (Cougle et al., 2012). This merits further speculations.

One recent study has found increasing IU across the last two decades in non-clinical undergraduate populations (Carleton, Desgagné, Krakauer, & Hong, 2019). The authors attribute increasing IU to increased access to mobile phones, which can be used by college students to quickly and consistently attain reassurance from close others. Such access, over the long-term, the authors hypothesize, may minimize situations where individuals must cope with extended periods of uncertainty. This cross-cohort increase of IU is one possible explanation for its outsize association with reassurance seeking, relative to at least one previous study.

The cross-sectional analyses in this study build on previous research by replicating the previous study that found significant associations among IU, anxiety, and depression with reassurance seeking. It provides novel findings in suggesting that the relationship between anxiety and reassurance seeking may be mostly explained by IU. The next aims of the study extend previous work by evaluating the relations among daily experiences of anxiety, reassurance seeking and negative social life events (addressed in Aim 3, below).

Longitudinal Findings: Reassurance Seeking and Anxiety

Analyses of the longitudinal data found that, controlling for baseline depression, increased daily reassurance seeking was associated with increased daily anxiety. Specifically, daily reassurance seeking was decomposed into two terms, one representing an individual's mean level of reassurance seeking across the EMA period, and the other representing daily deviation from his/ her mean level of reassurance seeking. The analyses found that both terms were significantly associated with concurrent daily anxiety.

The significant relation between mean reassurance seeking level and anxiety is congruent with the multitude of studies reporting cross-sectional, between-person, relations between trait anxiety (Cougle et al., 2012; Lerew et al., 1999) or anxiety diagnoses (Beesdo-Baum et al., 2012; Heerey & Kring, 2007), and reassurance seeking.

However, to my knowledge, this study is the first to show quantitative, contemporaneous evidence of the relation between variation in daily reassurance seeking behaviors and concurrent, state, anxiety. That is, beyond the non-specific result that

more anxious individuals more often engage in reassurance seeking, this result suggests an individual who seeks reassurance more often (compared to his or her mean pattern) on a given day also reports more anxiety on the same day. This finding, to my knowledge, offers the first quantitative, concurrent data to support endorsements by individuals that they seek reassurance seeking in attempts to alleviate tension and anxiety (Halldorsson & Salkovskis, 2017; Parrish & Radomsky, 2010). If confirmed in future studies, the finding has clear clinical implications. For someone who often copes with anxiety by seeking reassurance, bringing a client's attention to this relation may be helpful in teaching her to better recognize and cope with their anxiety.

The current study did not evaluate whether seeking reassurance was effective in decreasing anxiety over the short- or long-term. Some evidence suggests that reassurance seeking is associated with immediately decreased anxiety. For clinically anxious populations, but not healthy controls, reassurance is also associated with medium-term increases in anxiety (Salkovskis & Kobori, 2015; Salkovskis & Warwick, 1986). Therefore, future work using an EMA design might confirm the previous finding that healthy controls continue to have decreased anxiety over the medium and long-term after seeking reassurance. Indeed, it is possible that the effectiveness of reassurance in providing lasting relief for non-clinical populations may be an important predictor of the relation between normative and excessive levels of reassurance seeking.

Further, given some other research that checking (in the context of OCD) decreases confidence in one's own memory (Tolin et al., 2001), the question also arises as to whether seeking reassurance may be associated with decreases in one's self-efficacy

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to make a decision or to cope with perceived threat. This speculation is consistent with other research suggesting that reassurance seeking impairs learning in distinguishing between real and perceived threat (Salkovskis, 1991; Salkovskis & Warwick, 1986).

Longitudinal Results: Reassurance Seeking and Negative Social Life Events

Analyses conducted using multi-level regression models found that daily mean reassurance seeking was associated with the number of negative social life events (stressors). This finding is consistent with that of Eberhart and Hammen (2009), who reported that a person's global reassurance seeking were associated with longitudinally-measured romantic conflicts. The finding by Eberhart and Hammen, and this study's corollary finding, are somewhat suggestive of, but ultimately not specific enough to conclude in favor of stress generation.

That is, the results of this study did not show that day-to-day variation in reassurance seeking was significantly associated with the next day's negative social life events. The lack of a significant finding fails to support the premise that reassurance seeking is associated with increased negative life events, as a necessary condition in the theory of stress generation (Hammen, 2006). A significant increase in negative life events was found by Eberhart and Hammen (2009).

Some differences between the studies could account for the discrepant findings. First, there was a small possible range in the outcome variable, in that it was intended to be between zero and six, but the experimenter error resulted in a more restricted range of zero to five. And then within the observed data, the median for the population never rose above one and was most often zero. This means that there was a small amount of

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variation that could be explained by the predictors. Second, the analytical approach in this study I used is arguably more stringent. Specifically, I lagged the negative life events outcome to avoid any confounding of the presumed causal relationship (e.g. a person who seeks reassurance immediately following a romantic conflict rather than seeking reassurance leading to a romantic conflict).

Third, the scope of relationships considered in the two studies' measures was somewhat different. The measures in the current study examined diffuse types of reassurance seeking (i.e. did not specify the person from whom one sought reassurance) and negative social events (with family, friends, or a date). Eberhart and Hammen (2009) specified both the targets of reassurance seeking (one's partner) and the variety of stressors (romantic conflicts).

This narrower scope of reassurance seeking and life events is common in the stress generation literature (Shahar, Joiner, Zuroff, & Blatt, 2004; Stewart & Harkness, 2015). Shahar et al. (2004), for example, found evidence for the relation between reassurance seeking and spousal-generated stress, but not stress in other social or achievement domains. Thus, it may be that the scope of the study was too diffuse, producing a low "signal-to-noise" ratio, to find the true relation between anxiety-driven reassurance seeking and stressors. Indeed, only about 42 % of participants in this study reported being in a romantic relationship.

Even so, other studies in the literature report findings that support a significant association between depressive reassurance seeking and social stressors that is not specific to a romantic relationship (Birgenheir, Pepper, & Johns, 2010; Hernandez, Trout,

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& Liu, 2016; Joiner et al., 1992; Liu et al., 2014). Thus, it may be that depressive, but not anxious reassurance seeking is most corrosive to relationships, and therefore, results in greater dependent stressors. It seems possible that seeking reassurance about a decision one is making is of an entirely different emotional tenor, with different attributions, than about whether another loves the reassurance seeker (Swann & Bosson, 1999). Swann and Bosson begin their paper (p. 302) with a quotation from the partner of a clinically depressed person, which reads "Do you really think I'm the type of person who'd tell you that I love you if it wasn't true?" This response seems qualitatively different than the theoretical question associated with anxious reassurance seeking - "Do you think I'm the type of person who'd intentionally tell you to make the wrong decision?" with the former indicating questions about the integrity of the person, and the latter indicating questions about the judgment.

Thus, although the current study did not find a significant relationship between reassurance seeking and increases in negative social life events, further investigation with varying scopes (for both reassurance seeking and conflicts) may still be warranted. Nonetheless, this study was the first, to my knowledge, to investigate the relationship between daily, anxious reassurance seeking and negative life events in a sample of emerging and young adults.

Longitudinal Results: Moderation by Gender

Analyses from the model for Aim 4 did not find support for a relationship between RS behaviors and stress events. Further, the relation between RS and stressful events was not moderated by gender (Aim 5). This was an exploratory aim, given that

published studies are somewhat inconsistent in their findings. At least two studies have reported greater reassurance seeking in females (Knobloch et al., 2011; Shih & Auerbach, 2010), a finding which was not replicated in this study (Wilcoxon $z = 1.81$, $p = .0703$) at baseline. Further, one study reported a relationship between reassurance seeking and stress generation in women, but not men (Shih & Auerbach, 2010). Given that cell sizes were somewhat small (for gender × high RSS group), it may be that with a larger sample size, there may have been a significant effect of moderation. Women, on the whole, reported more negative life events but this relationship did not moderate the association between RS and negative life events.

Completeness and Integrity of Study Data

As noted earlier, study compliance is an important aspect of determining the validity and reliability of EMA study data. Signal compliance, broken down into affective and behavioral surveys was comparable to that of other recent studies with similar designs and similar populations. In this study, behavioral survey compliance for any given day ranged from 78 to 93% with an average of 86.4%. Participants in this study completed a median of 13 of 14 behavioral responses, compared with an average of 12.48 of 14 daily diaries in the study by Raposa and Hammen (2018). On any given day, in this study, compliance with completion of affective surveys (defined as three to four responses, depending on the recruitment source) ranged from 65 – 82%, with at least one response from participants averaging at 97%.

Reactivity. Analyses in this study found a decrease in the level of the three reported constructs of interest over the 14-day study period (anxiety, reassurance seeking,

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and stressful life events), which I consider to be reactivity. In a review paper, Shiffman et al. (2008) reports that reactivity is not universally found in EMA papers, except when participants are monitored in an attempt to change target behaviors. Similarly, in a systematic review of EMA studies in patients with anxiety disorders (Walz, Nauta, & aan het Rot, 2014), among the studies which tested for reactivity, most did not find evidence of reactivity across all measures. Specifically, Walz and colleagues mention one study (Possemato et al., 2012) which found prospective decreases in anxiety symptoms, but retrospective increases. Further, the systematic review by Walz and colleagues suggests that "Increased awareness as a direct consequence of ESM [experience sampling methods] / EMA [ecological momentary assessment] data recording may be a corollary to take into account when interpreting study findings" (p. 933). Although this study was not presented as a monitoring-to-change study, it is possible that participants in the study perceived a need and urgency to change, which may be related to a strong achievement orientation of individuals associated with this university. It may also be that participants in the study, as they became tired or frustrated with the length of the study, began to report fewer events and lower anxiety to more quickly complete the surveys. Nonetheless, the reactivity found in this study is not characteristic of most EMA studies in the literature.

Strengths of the Study

Despite the study's limitations, which I address in the next section, the study does have some strengths that provide important contributions.

First, anxiety and reassurance seeking were measured both cross-sectionally and longitudinally (using an EMA design) which allows inference regarding between- and within-person considerations. The results showed that increased reassurance seeking, relative to one's mean individual level, was associated with increased anxiety. This sensitive test of the relation represents an important advancement over previous research.

Second, signal compliance was high throughout the study, and comparable to previous studies with this population. These data allow confidence in the results. Third, the study used measures that were previously validated and were internally consistent (all Cronbach Alphas > 0.8). In this vein, the reassurance seeking measure demonstrated predictive validity between cross-sectional and the daily surveys ($r = 0.4$). Finally, it evaluates clinically relevant constructs and behaviors that bear upon future research into reassurance seeking as a safety behavior.

Limitations of the Study

Measure of life stressors. As noted by Hammen (1991, 2016), gold standard investigation of the stress generation theory requires the use of a contextual life stress interview which takes into account both the severity of the event and the extent of dependence, that is, to what extent the participant may have contributed to its occurrence. The EMA design calls for daily reports, which does not lend itself to a comprehensive life stress interview (although some have used a hybrid method (e.g. Eberhart & Hammen, 2010). Nonetheless, reliance on the category of negative interpersonal events is only an inexact proxy for the outcome of dependent events.

Experimenter error. Additionally, experimenter error resulted in omitting one of the six questions that comprise the negative social life events, ("plans fall through with someone special") for approximately two-thirds of the participants. Given that the data for this question were missing for the majority of participants, all analyses were completed with the five-item, rather than the six-item subscale. This choice decreased possible variance in the outcome measure and thus the likelihood of finding a significant result. Further, this error limits comparison with other studies which have used this measure (e.g. A. S. Farmer & Kashdan, 2012).

Requirement of access to a mobile device. Given that the experimenter did not provide mobile devices to participants, the inclusion criteria of having access to a Google mail address and smartphone raises the question of whether the study may have inadvertently recruited those of a higher socioeconomic status. An estimated 83% of individuals 18 – 29 report having a Google mail account (Morning Consult, 2017), and, creating such an account is free and reasonably simple. Further, related to the requirement that participants have access to a mobile device, research suggests that 94% of individuals between ages 18 and 29 own a smartphone (Pew Research Center, nd), of which an estimated 99.9% use either an Android or iOS operating system (Morning Consult, 2017). Thus, neither inclusion criterion likely biased the study sample in a significant way.

Sampling of participants' days. In the EMA portion of the study, participants' affective states were sampled at a fixed interval, rather than variable interval. This strategy may have systematically over or underestimated daily reports of anxiety by

associating current affective state with situational factors (Stone & Shiffman, 2002). This schedule was adopted for the ease and predictability of the participants in an attempt to enhance compliance. In the future, I may want to consider sampling affective states at variable intervals for more representative sampling of individuals' lives (Hektner et al., 2006).

Reactivity to study prompts. As addressed in an earlier section, the data indicate reactivity over time in that time was associated with reporting less anxiety, fewer reassurance seeking events, and fewer life stressors. Although this may be considered reactivity in that participants were experiencing less anxiety, it may also have represented fatigue with the length of the study.

Future studies

The results and methods of this study lend themselves to multiple future studies and refining of questions examined in this dissertation.

The first area for future study would be to investigate in a more fine-grained way for whom and to what extent seeking reassurance is effective. Gillett and Mazza (2018) noted that reassurance seeking in some situations (e.g. requesting feedback from a peer, or confirming the coffee is decaffeinated) may be effective in limited quantities. As noted earlier, one possible way to distinguish between effective and ineffective reassurance seeking is to examine for whom receipt of reassurance contributes to a lasting decrease in anxiety and uncertainty, and for whom it does not.

Second, although participants reported whether, and how many times, they sought reassurance, they did not report the extent to which they successfully attained

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reassurance, and the extent to which it decreased anxiety. Further investigation into this topic may involve investigating specifically to whom one goes to for reassurance and how often that reassurance is provided.

Third, using novel and innovative methods to study these constructs of interest (anxiety, reassurance seeking, life stressors) would enhance understanding of the topic. Given that reassurance seeking is theoretically an observable behavior, studying it in the laboratory as others have done (Lemay & Cannon, 2012; McClintock et al., 2014; Stewart & Harkness, 2017) would be of interest. Specifically, if one could manipulate the degree of uncertainty to assess in-vivo reassurance seeking, it could provide further information about causal pathways. Ladouceur, Gosselin and Dugas (2000) conducted a similar experiment with worry as an outcome. Further, collecting reports by others (beyond self-report) would be a welcome additional data source and would continue to allow us to better evaluate the reliability of self-report in this behavioral domain.

Fourth, this study evaluated a sort of diffuse reassurance seeking and negative social life events, with regards to the total social environment, rather than a focal relationship. Many studies of excessive reassurance seeking though seem to focus in on romantic relationships (Eberhart & Hammen, 2009; Stewart & Harkness, 2015). An alternative path of study would be to evaluate these processes within other focal relationships, such as between a parent and a child. Reassurance seeking patterns in these relationships are likely relatively more well-engrained but may also change across development.

Conclusions

Previous research has considered reassurance seeking as a pathway to stress generation, although primarily in the context of depression. The current study used an EMA design to evaluate both whether anxiety was associated with reassurance seeking and whether reassurance seeking, in turn, was associated with increased occurrence of negative life events. It found that day-to-day reassurance seeking was associated with daily anxiety. The mean frequency of anxiety-driven reassurance seeking was positively associated with reported life stressors; however, daily variation in reassurance seeking was not associated with variation in next-day negative social life events. Thus the study provided only partial support for anxiety-driven stress generation. Future research should continue to rely on innovative methods to examine the relations among these variables.

Baseline measures

Reassurance Seeking Scale[1] (Rector et al., 2011)
Reassurance seeking is described as the seeking to restore a sense of confidence or to reduce anxiety or apprehension.

As such, we are interested in learning about the kinds of situation/events that prompt you to seek reassurance to feel more confident about yourself or to reduce emotional distress.

Please circle the number in the appropriate box to indicate how frequently you find yourself seeking reassurance around the following themes/events:

1. To whether something bad is going to happen to you?
2. To make sure you are okay?
3. To feel more relaxed?
4. To get approval from others?
5. To whether you are loved or cared for?
6. To gain more peace and serenity within yourself?
7. Before exploring something new?
8. When you are not getting "enough attention"?
9. To get support from others?
10. Prior to making a change in some area of your life (e.g., career, academic, relationships)?
11. Prior to making a decision?
12. When you doubt your decision?
13. When you have to do something on your own?
14. When you have to choose among alternative options?
15. To whether you have considered all the possible details prior to making a decision?
16. To avoid feeling responsible for the outcome of decisions in major areas of your life?
17. When you have a lot of responsibility about something?
18. When you think you have made the wrong decision?
19. To decrease your "sense of personal responsibility"?
20. Before initiating or doing things?
21. To whether you are a loving / caring person?
22. To gain more certainty about a situation or something that is uncertain?
23. To whether you have received a negative evaluation?
24. To whether you are safe?
25. To prevent the occurrence of a catastrophic event?

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[1] Also administered during screening

26. To feel better inside?
27. When you think a negative event is likely to occur?
28. To whether others are upset with you?
29. To turn off your anxiety feelings
30. To feel close to others

Response Options: 1 = Not at all; 2 = A little; 3 = Moderately; 4 = Quite a lot; 5 = Extremely

PHQ-8 (Kroenke et al., 2009)
Over the past 2 weeks, how often have you been bothered by any of the following problems?

1. Little interest or pleasure in doing things.
2. Feeling down, depressed or hopeless
3. Trouble falling asleep, staying asleep or sleeping too much
4. Feeling tired or having little energy.
5. Poor appetite or overeating
6. Feeling bad about yourself- or that you're a failure or have let your family down.
7. Trouble concentrating on things, such as reading the newspaper or watching television
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite – being so fidgety or restless that you have been moving around a lot more than usual.

Response Options: 0 = Not at all; 1 = Several days; 2 = More than half the days; 3 = Nearly every day

GAD-7 (Spitzer et al., 2006)
Over the past 2 weeks, how often have you been bothered by any of the following problems?

1. Feeling nervous, anxious, or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless that it's hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid as if something awful might happen

Response Options: 0 = Not at all; 1 = Several days; 2 = More than half the days; 3 = Nearly every day

Intolerance of Uncertainty Inventory (Carleton et al., 2007)

You will find below a series of statements which describe how people may react to the uncertainties of life. Please use the scale below to describe to what extent each item is characteristic of you. Please select the number (1 to 5) that describes you best.

1. Unforeseen events upset me greatly.
2. It frustrates me not having all the information I need.
3. One should always look ahead so as to avoid surprises.
4. A small, unforeseen event can spoil everything, even with the best of planning.
5. I always want to know what the future has in store for me.
6. I can't stand being taken by surprise.
7. I should be able to organize everything in advance.
8. Uncertainty keeps me from living a full life.
9. When it's time to act, uncertainty paralyzes me.
10. When I am uncertain I can't function very well.
11. The smallest doubt can stop me from acting.
12. I must get away from all uncertain situations.

Response Options: 1 = Not at all characteristic of me to 5 = Entirely characteristic of me.

Daily measures

Positive and Negative Affect Schedule – Expanded Form (Watson & Clark, 1994)

Fear subscale:

1. Afraid
2. Scared
3. Frightened
4. Nervous
5. Jittery
6. Shaky

Sadness subscale:

1. Sad
2. Blue
3. Downhearted
4. Alone
5. Lonely

Positive affect subscale:

1. Joyful

2. Enthusiastic
3. Determined
4. Proud
5. Attentive

Response Options: 1= Very slightly or not at all to 5 = Extremely

Reassurance Seeking Scale (Adapted from Eberhart & Hammen, 2009; Rector et al., 2011)

Think about the experiences you have in your relationships TODAY. For each item, please respond to the question with the number of times you engaged in that behavior today.

1. How many times today did you seek reassurance prior to making a decision or about a decision you have already made?
2. How many times today did you seek reassurance about whether you are loved or cared for?
3. How many times today did you seek reassurance about whether something bad will happen to you?

Response Options: Free-scale numeric answer for frequency

Modified Life Events Survey (Nezlek & Gable, 2001)

In the questions below, rate each event that happened today on how important it was to you. If the event did not happen today, then choose did not occur

Note!: If you're completing the survey the morning after it was sent to you, please complete it about the events of yesterday.

Positive Achievement Events subscale:
2. Completed work on an interesting project or assignment
8. Met a daily fitness goal
10. Performed well (sports, music, speaking, drama, etc.)
15. Got caught up (or ahead) in coursework or work duties
18. Classmate, teacher, co-worker, or friend complimented me on my abilities
21. Did well on a school or work task (e.g. test, assignment, job duty)
25. Had other type of pleasant event (not listed above concerning performance at school, work, or another activity).

Negative Achievement Events subscale:
3. Did poorly on schoolwork task (e.g. test, assignment, job duty)
6. Fell behind in coursework or duties

12. Classmate, teacher, co-worker or friend criticized me on my abilities
17. Failed to meet a daily fitness goal.
20. Tried to do homework and could not understand it.
26. Had other type of unpleasant event (not listed above) concerning school, work, or another activity.

Positive Social Events subscale:
1. Had especially good interactions with friend(s) or acquaintances.
7. Went out socializing with friends/date (e.g. party, dance club)
9. Had especially good interactions with my steady date.
13. Did something special for a friend/steady date that was appreciated.
14. Flirted with someone or arranged a date.
19. Went out to eat with a friend/date.
23. Had other type of pleasant event (not listed above) with friends, family, or date.

Negative Social Events subscale:
4. Did something awkward or embarrassing in a social situation
5. Was excluded or left out by my group of friends
11. A disagreement with a close friend or steady date was left unresolved
16. Got along poorly with peers (e.g. classmates, co-workers, roommates)
22. Had plans fall through to spend time with someone special.[2]
24. Had other type of unpleasant event (not listed above) with friends, family or date.

Response Options: 0 = Did not occur; 1 = Occurred and not very meaningful to 5= Occurred, and very meaningful

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[2] Due to experimenter error, this question was omitted from the nightly questionnaire from March 2018 through August 2018 (69 participants). For all participants from September 2018 through February 18, it was included.

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Biography

Allison Meyer attended Emory University in Atlanta, GA. As an undergraduate, she was inducted into Phi Beta Kappa, Theta Alpha Kappa, and Psi Chi Honor Society in Psychology. She also was a Dean's Achievement Scholar in and was awarded the Emory Scholars Travel Abroad Scholarship, allowing her to engage in cross-cultural research in Samoa and Vanuatu. She completed an honors thesis exploring empathy and pain under the mentorship and direction of Drs. W. Edward Craighead and Lorie Ritschel, graduating *summa cum laude* from Emory University in 2011.

She matriculated into the Clinical Psychology program at Duke University in 2013, where she worked under the mentorship of Dr. John Curry as she explored transdiagnostic processes related to anxiety and depression and their role in stress generation. She earned a Master of Arts degree from Duke University in 2013, producing a systematic review which she later published in *Clinical Psychology Review* (Meyer & Curry, 2017). She has also co-authored three chapters on the treatment of adolescent depression (Curry & Meyer, 2017; 2019; in-press) and served as lead author on a paper exploring barriers to evidence-based practice for clinical stakeholders (Meyer et al., 2019). She will complete an APA-accredited Clinical Psychology Internship at Mary A. Rackham Institute at the University of Michigan in August 2020.