Experiential Avoidance as a Moderator of the Relationship Between Anxiety Sensitivity and Perceived Stress

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Abstract

Given the significant deleterious effects of stress on psychological and physical wellbeing, the present two-part study sought to clarify relations among putative vulnerability factors (i.e., anxiety sensitivity, experiential avoidance) for perceived stress. Relations among anxiety sensitivity, experiential avoidance, and perceived stress were examined using a large college student sample ($N = 400$) in Study 1 and were replicated using a large community sample ($N = 838$) in Study 2. As predicted, experiential avoidance moderated the relationship between anxiety sensitivity and perceived stress. Contrary to expectations, simple effects in both studies revealed that anxiety sensitivity shared a significant positive association with perceived stress at low, but not high, levels of experiential avoidance. The moderating role of experiential avoidance was found to be robust to the effects of general distress. Moreover, anxiety sensitivity and experiential avoidance evidenced a differential pattern of relations with perceived stress than was evidenced with related negative affective states (i.e., anxiety and depression). The present results suggest that experiential avoidance appears to be a vulnerability factor of particular importance for understanding the phenomenology of perceived stress. Conceptual and clinical implications are discussed.

Keywords: perceived stress, anxiety sensitivity, experiential avoidance, interaction effect, anxiety, depression

Experiential Avoidance as a Moderator of the Relationship Between Anxiety Sensitivity and Perceived Stress

Subjective perception of stress has been linked to a wide array of psychological and physiological pathology, including, but not limited to, depression (Hewitt, Flett, & Mosher, 1992), social anxiety (Cohen, Kamarck, & Mermelstein, 1983), skin picking (Singareddy, Moin, Spurlock, Merritt-Davis, & Uhde, 2003), male infertility (Band, Edelmann, Avery, & Brinsden, 1998), and rheumatoid arthritis (O'Leary, Shoor, Lorig, & Holman, 1988). Moreover, empirical research has shown that perceived stress is a prospective predictor of negative health-related and pathological outcomes (Golden-Kreutz et al., 2005; Morrison & O'Connor, 2005). Furthermore, chronic perceived stress has been shown to induce neurobiological changes in brain structures associated with enhanced fear conditioning (i.e., amygdala; e.g., Holzel et al., 2010) and regulation of emotion (i.e., prefrontal cortex; e.g., Liston, McEwen, & Casey, 2009). These changes impair one's ability to regulate affective states and increase the likelihood that heightened levels of perceived stress will develop into a more severe pathological condition. Such findings highlight the importance of perceived stress in understanding negative psychological and physiological outcomes.

It is important to note that while stressful life events are associated with increased risk for problematic outcomes (e.g., Grilo et al., 2012; Yan-Meier et al., 2011), perceived stress appears distinct from the occurrence of stressful life events. For example, correlations between stressful life events and perceived stress are only small to medium in size (*r*s = .17 to .39; Cohen et al., 1983). Further, perceived stress has been shown to share significant positive associations with indices of psychopathology after accounting for the effects of stressful life events (Pbert, Doerfler, & DeCosimo, 1992; Watson, 1988). Thus, the available literature highlights the

importance of gaining greater insight into subjective appraisals of stress rather than simply counting the number of potentially stressful life events that one has experienced.

As noted, links have been drawn between perceived stress and psychopathology (Golden-Kreutz et al., 2005; Morrison & O'Connor, 2005; Pbert et al., 1992; Watson, 1988). In fact, researchers consider stress perception as a second-order cognitive vulnerability factor for psychopathology, with stress perception being influenced by first-order cognitive vulnerability. Specifically, perceived stress requires more time to appraise both the demands of a given situation and one's ability to cope with such demands relative to more automatic, or first-order, cognitive vulnerability factors (Zvolensky et al., 2002). While a good deal of effort has been put forth in examining the role of perceived stress in deleterious outcomes, examinations of putative first-order, or more automatic, vulnerability factors for heightened stress perception are limited in the extant literature. Gaining greater insight into the interplay between first- and second-order vulnerability factors for perceived stress can shed further light onto how such vulnerability factors impact this phenomenon, which in turn might elucidate particular targets of interventions for reducing the impact of perceived stress on emotional functioning.

Anxiety sensitivity is purportedly one first-order vulnerability factor that influences stress perception (Zvolensky et al., 2002). Anxiety sensitivity, conceptualized as a fear of arousal-related sensations due to beliefs that such sensations will have adverse psychological, social, and physical outcomes (Reiss & McNally, 1985), has been implicated in a wide range of mood and anxiety pathology (for a review see Naragon-Gainey, 2010). Anxiety sensitivity is most-often described as a dimensional trait-like factor (e.g., Bernstein et al., 2005; 2007), which serves to escalate fearful responses to stimuli that are perceived as potentially anxiety-provoking (Taylor & Cox, 1998). Because of its trait-like nature, and the rapidity with which physiological and

behavioral responses to anxiety-provoking stimuli are observed, anxiety sensitivity is considered a cognitive vulnerability factor related to bottom-up, or more automatic processing (e.g., information processing biases; Teachman, 2005). Thus, as described by Zvolensky et al., anxiety sensitivity can be considered *primary* and perceived stress considered *secondary* in the temporal chain of event appraisal. As such, Zvolensky et al. conceptualize anxiety sensitivity as a cognitive vulnerability factor for heightened stress perception.

In support of this conceptualization, research has identified a positive association between anxiety sensitivity and perceived stress (Isyanov & Calamari, 2004; Zvolensky et al., 2002). However, the available literature suggests that the impact of anxiety sensitivity on negative outcomes depends on one's willingness to accept negative emotions. As noted by Kashdan, Zvolensky, and McLeish (2008), "...there is a growing recognition that how individuals regulate emotional experiences, is critical in understanding how anxious and fearful responding is maintained and exacerbated," (p. 430). Following this rationale, Kashdan et al. examined the relations among anxiety sensitivity, emotion dysregulation, and anxiety symptoms in a community sample of young adults ($N = 248$). As expected, a moderation effect was observed in which the relationship between anxiety sensitivity and anxiety symptoms was strongest among participants with higher anxiety sensitivity and a greater unwillingness to accept negative emotions. Thus, findings suggest that it may be important to account not only for anxiety sensitivity when examining vulnerability factors for heightened perceived stress, but also one's willingness to stay in contact with negative internal experiences.

Experiential avoidance represents an unwillingness to stay in contact with unwanted inner experiences (i.e., negative emotions, thoughts, bodily sensations, memories; Hayes, Wilson, Gifford, Follette, & Stroshal, 1996). Although some researchers have suggested that

experiential avoidance is a specific emotion regulation strategy (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010), in its original conceptualization (e.g., Hayes et al., 1996) experiential avoidance is described as a style of interacting with inner experiences, which may ultimately lead to the use of specific emotion regulation strategies (e.g., cognitive suppression, behavioral avoidance). Although the avoidance of unwanted inner experiences can help alleviate distress in the short-term, experiential avoidance has a paradoxical long-term effect in which it actually exacerbates distress (Hayes et al., 1996). As such, experiential avoidance has been suggested to underlie many detrimental outcomes (for a review see Hayes et al., 2004).

To date, an examination of a potential association between experiential avoidance and perceived stress has yet to be conducted. However, evidence suggests a strong positive association between anxiety sensitivity and experiential avoidance (e.g., Berman, Wheaton, McGrath, & Abramowitz, 2010; Tull & Gratz, 2008). It seems intuitive that individuals experiencing bodily sensations to which they are highly averse, would seek immediate relief from such sensations through both cognitive and behavioral avoidance. However, among individuals with relatively high anxiety sensitivity, greater acceptance of negative emotional states, in comparison to the use of maladaptive emotional avoidance, may result in relatively lower perceived stress. In other words, the effects of anxiety sensitivity and experiential avoidance on perceived stress may be interactive, with the association between anxiety sensitivity and perceived stress becoming increasingly stronger with increasing levels of experiential avoidance. Thus, experiential avoidance may determine the degree to which anxiety sensitivity is associated with perceived stress.

Study 1

As a next step in clarifying the individual difference factors that result in heightened stress perception, Study 1 sought to examine associations among anxiety sensitivity, experiential avoidance, and perceived stress. Consistent with previous research (e.g., Isyanov & Calamari, 2004; Tull & Gratz, 2008), we expected that anxiety sensitivity would evidence strong positive associations with both experiential avoidance and perceived stress. Based on evidence showing positive associations between experiential avoidance and a wide array of pathological symptomatology (see Hayes et al., 2004), we predicted that perceived stress would be positively associated with experiential avoidance. In addition, based on the above rationale, we examined whether experiential avoidance moderated the relationship between anxiety sensitivity and perceived stress. Considering the literature, Kashdan et al. (2008) in particular, we predicted that the relationship between anxiety sensitivity and perceived stress would be stronger as experiential avoidance increased.

Method

Participants & Procedure

The sample consisted of 411 undergraduate students recruited from a mass testing pool at a Midwestern U.S. university. Eleven participants (2.5% of total sample) omitted responses to study measures and were excluded from reported analyses. The final sample ($N = 400$) was 54% female and had an average age of 20 years ($SD = 2.2$). In regard to race, 60.5% of the sample self-identified as White, 19.5% as Black, 6.5% as Asian, 0.3% as American Indian or Alaska Native, 12% endorsed “other”, while 1.3% preferred not to respond. Additionally, 10.8% of participants identified as Hispanic.

For this institutional review board approved study, participants completed a battery of random-ordered questionnaires assessing anxiety sensitivity, experiential avoidance, and

perceived stress. Informed consent and study questionnaires were administered via a secure online survey program; participants could complete the study at any computer with internet access. As part of the informed consent process, participants were informed that their responses were confidential and that they were free to withdraw from the study at any time. Students received partial course credit toward their introductory psychology course requirement for participation. Through the use of participant pool management software, the authors were able to confirm that participants did not complete the study more than once.

Measures

Demographics. Age, sex, and race/ethnicity were evaluated for inclusion as potential covariates in planned analyses. Race/ethnicity was collapsed into a single dummy coded variable (coded as Non-Hispanic White [n = 228, 57%] versus all others [n = 169, 43%]).

Acceptance and Action Questionnaire-II (AAQ-II). The AAQ-II (Bond et al., 2011) is a 7-item self-report measure that assesses one's ability to remain in contact with painful and negative private events (e.g., *I'm afraid of my feelings, My painful memories prevent me from having a fulfilling life*). Higher scores on the AAQ-II are indicative of higher levels of experiential avoidance. The AAQ-II has demonstrated adequate psychometric properties (Bond et al., 2011). Internal consistency for the AAQ-II in the present sample was excellent (α = .93).

Anxiety Sensitivity Index-3 (ASI-3). The ASI-3 (Taylor et al., 2007) is an 18-item self-report measure that assesses the fear of arousal-related sensations due to physical, cognitive, and social concerns. Higher scores on the ASI-3 are indicative of higher levels of anxiety sensitivity. The ASI-3 has demonstrated adequate psychometric properties (Taylor et al., 2007). Internal consistency for the ASI-3 in the present sample was excellent (α = .95).

Perceived Stress Scale (PSS). The PSS (Cohen et al., 1983) is a 10-item self-report measure that assesses global perceived stress, or the degree to which one perceives life events to be unpredictable, overwhelming, and out of one's control (e.g., *In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?*). Participants rated how often they felt or thought a certain way in the past month on 5-point scale (0 = *never* to 4 = *very often*). Higher scores on the PSS are indicative of greater perceived stress. The PSS has demonstrated adequate psychometric properties (Cohen et al., 1983). Internal consistency for the PSS in the present sample was adequate (α = .81).

Results

Preliminary Analysis

Descriptive statistics for study variables are presented in Table 1. As expected, anxiety sensitivity, experiential avoidance, and perceived stress all were positively correlated. Of potential covariates (i.e., age, sex, race/ethnicity), sex and race/ethnicity were associated with variables of interest. Females reported greater perceived stress in comparison to males (M = 18.72, SD = 6.68; M = 17.01, SD = 6.68, respectively), and individuals who identified themselves as Non-Hispanic White, in comparison to those who self-identified with any other racial/ethnic group, reported lower anxiety sensitivity (M = 14.05, SD = 11.76; M = 16.92, SD = 14.22, respectively). Given the significant correlations between demographic variables and variables of primary interest, sex and race/ethnicity were included as covariates in multivariate analysis, while age was excluded from further analysis.

Hierarchical Multiple Regression

A hierarchical multiple regression analysis was conducted to examine experiential avoidance as a moderator of the relationship between anxiety sensitivity and perceived stress.

Predictor variables were mean centered and an interaction term was computed by multiplying the centered predictors (Aiken & West, 1991). In the first step of the model, covariates (i.e., sex, race/ethnicity), anxiety sensitivity (i.e., ASI-3), and experiential avoidance (i.e., AAQ-II) served as predictor variables and perceived stress (i.e., PSS) served as the outcome variable. In the second step, an interaction term comprised of anxiety sensitivity and experiential avoidance was entered into the model as a predictor variable.

As seen in Table 2, there was a significant main effect of experiential avoidance in predicting perceived stress, $p < .001$; however, when accounting for experiential avoidance, sex, and race/ethnicity, there was not a main effect of anxiety sensitivity. In the second step of the model, the anxiety sensitivity x experiential avoidance interaction term significantly predicted perceived stress, $\Delta R^2 = .02$, $p < .001$. The effect size of this interaction was small in magnitude (Cohen's $f^2 = .03$; Aiken & West, 1991).

Following Aiken & West's (1991) recommendation for interpreting significant interaction effects, a follow-up simple slopes analysis was conducted. Specifically, two simple regression equations were constructed in which the relationship between anxiety sensitivity and perceived stress was tested at both high (+1 *SD*) and low (-1 *SD*) levels of experiential avoidance. Simple slopes analysis revealed that there was no significant association between anxiety sensitivity and perceived stress for participants who reported higher experiential avoidance. However, there was a significant positive association between anxiety sensitivity and perceived stress for participants who reported lower experiential avoidance, $B = .11$, $\beta = .22$, $p < .001$, with participants low in experiential avoidance and high in anxiety sensitivity reporting greater perceived stress than participants low in experiential avoidance and low in anxiety sensitivity (see Figure 1).

Study 1 Discussion

In Study 1 we examined associations among anxiety sensitivity, experiential avoidance, and perceived stress. As predicted, the study variables all shared significant positive intercorrelations. Interestingly, although we found support for our proposal that experiential avoidance moderates the relationship between anxiety sensitivity and perceived stress, the observed pattern of simple effects deviated from our predictions. Specifically, we predicted that the relationship between anxiety sensitivity and perceived stress would grow increasingly stronger as experiential avoidance *increased*. However, simple effects revealed a significant positive association between anxiety sensitivity and perceived stress at low, but not high, levels of experiential avoidance. Given its unexpected nature, we conducted a second study in an attempt to replicate the observed interaction. Moreover, we sought to extend Study 1 findings by examining the interaction in an adult community sample. Replicating and extending Study 1 findings would further strengthen the tenability of the observed interaction and allow us to consider firmer conclusions surrounding the pattern of relations among anxiety sensitivity, experiential avoidance, and perceived stress.

An important extension of the Study 1 findings is to examine the robustness of the observed interactive effect. Specifically, some researchers have suggested that perceived stress and general distress represent the same underlying construct (Lazarus, DeLongis, Folkman, & Gruen, 1985; Watson, 1988). In contrast, other researchers have suggested that perceived stress and general distress are related, but can be distinguished based on appraisals of one's ability to meet the demands of a situation or event More specifically, whereas indicators of general distress often represent a variety of factors which influence psychological well-being (e.g., tension, arousal, aversive mood states; Lovibond & Lovibond, 1995a, Watson, Clark, & Tellegen, 1988), perceived stress accounts for the degree to which life events are perceived to be unpredictable,

overwhelming, and out of one's control (Cohen et al., 1983). Given the debate over the distinctiveness of these two constructs, the degree to which the interaction effect observed in Study 1 was a function of the shared variance between perceived stress and general distress was examined in Study 2.

In addition, it is important to examine the specificity of the observed interactive effect. For example, Kashdan et al. (2008) found that the relationship between anxiety sensitivity and anxiety symptoms grew increasingly stronger as an unwillingness to accept negative emotions increased. However, Kashdan et al. found no interactive effect between anxiety sensitivity and an unwillingness to accept negative emotions as these variables related to symptoms of depression. Kashdan et al. suggested that the interaction term did not predict symptoms of depression, but did predict anxiety symptoms, because the fear of arousal-related sensations (i.e., anxiety sensitivity) may be particularly relevant to individuals with higher levels of anxiety and an unwillingness to stay in contact with unwanted inner experiences. Based on Kashdan et al.'s work, as well as Study 1 findings, it would appear that anxiety sensitivity and experiential avoidance may differentially impact related, but distinct, negative affective states. More specifically, the combined impact of anxiety sensitivity and experiential avoidance might affect anxiety symptoms and perceived stress, but not symptoms of depression. Study 2 sought to further assess these potential relations by examining the interactive effect between anxiety sensitivity and experiential avoidance in the concurrent prediction of perceived stress, anxiety symptoms, and symptoms of depression.

In these analyses, we expected to replicate the observed interactive effect observed in Study 1. Further, and consistent with Kashdan et al. (2008), we expected that (a) the relationship between anxiety sensitivity and anxiety would grow increasingly stronger as experiential

avoidance increased, and (b) anxiety sensitivity and experiential avoidance would *not* interact to predict depression symptoms. The predicted differential pattern of relations among anxiety sensitivity, experiential avoidance, and the targeted negative affective states would provide further support for the distinctiveness of perceived stress from related constructs.

Study 2

Method

Participants & Procedure

Participants were recruited using Amazon Mechanical Turk, an online labor market through which researchers can recruit adults from the general public to complete online surveys in exchange for payment. For Study 2, 993 participants logged on to the study website and completed the informed consent process. Of these, 14 participants failed to complete at least 50% of study questionnaires and were thus removed from the sample. Although a number of studies have demonstrated the reliability of data collected via Amazon Mechanical Turk (e.g., Behrend, Sharek, Meade, & Wiebe, 2011; Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010), three catch questions were embedded in the online survey to ensure that participants were being attentive. Each catch question is designed so that there is only one correct, and obvious answer (e.g., “While watching television, have you ever had a fatal heart attack?, Please click the circle at the bottom of the screen. Do not click on the scale items that are labeled from 1 to 9."; Oppenheimer, Meyvis, & Davidenko, 2009; Paolacci et al., 2010). One-hundred and forty-one participants (14.4%) failed to meet our a-priori bench mark of correctly answering two out of three catch questions and were thus excluded from the present study. The final sample (N = 838) was 60.5% female and had an average age of 34.1 years (SD = 12.6). In regard to race, 81.2% of the sample self-identified as White, 6.8% as Black, 6.3% as Asian, 1%

as American Indian or Alaska Native, 3% endorsed "other", while 2% preferred not to respond. Additionally, 6.8% of participants identified as Hispanic.

For this institutional review board approved study, participants completed a battery of random-ordered questionnaires assessing anxiety sensitivity, experiential avoidance, and perceived stress. Informed consent and study questionnaires were administered via a secure online survey program; participants could complete the study at any computer with internet access. Participants were administered the a battery of self-report measures. As part of the informed consent process, participants were informed that their responses were confidential and that they were free to withdraw from the study at any time. Upon study completion, participants were paid $0.50, an amount which is well within the range of what is typically paid to Mechanical Turk participants (Buhrmester, Kwang, & Gosling, 2011).

Measures

In addition to the self-report measures completed in Study 1 (i.e., demographics questionnaire, AAQ-II, ASI-3, PSS), participants also completed the 21-item version of the Depression, Anxiety, Stress, Scales (DASS-21; Lovibond & Lovibond, 1995a). The Dass-21 is a brief measure of depression (7 items; e.g., *I felt that life was meaningless*), anxiety (7 items; e.g., *I felt I was close to panic*), and stress (7 items; e.g., *I found it difficult to relax*). Each DASS-21 scale has shown adequate psychometric, including strong convergent correlations with other depression (r = .79), anxiety (r = .85), and stress (r = .71) scales (Antony, Bieling, Cox, Enns, & Swinson, 1998). Additionally, this measure is appropriate for use in non-clinical samples; Lovibond and Lovibond (1995b) note that the factor structure and performance of items are consistent across clinical and non-clinical samples. In Study 2, the DASS-21 Anxiety and Depression scales were used as outcome variables in regression analyses. The DASS-21 Stress

scale was used as a measure of general distress (Antony et al., 1998) in order to examine the degree to which the interaction effect observed in Study 1 was specific to perceived stress. The internal consistencies of Study 2 measures are as follows: AAQ-II = .95, ASI-3 = .94, PSS = .90, DASS-21: Anxiety = .87, Depression = .93, Stress = .90.

Results

Preliminary Analysis

Descriptive statistics for study variables are presented in Table 3. As expected, anxiety sensitivity, experiential avoidance, anxiety, depression, stress, and perceived stress all were positively correlated. Of potential covariates (i.e., age, sex, race/ethnicity), age and sex were associated with variables of interest. Age was negatively associated with the variables of interest (*p*s < .001). Consistent with Study 1, females reported greater perceived stress in comparison to males (M = 16.83, SD = 7.57; M = 18.68, SD = 8.54, respectively). Given the significant correlations between demographic variables and variables of primary interest, age and sex were included as covariates in multivariate analysis, while race/ethnicity was excluded from further analysis as a potential covariate.

Hierarchical Multiple Regressions

Predicting perceived stress. The hierarchical multiple regression analysis was nearly identical to the analysis conducted in Study 1, with two exceptions; age and stress were included as covariates in the first step of the model. As seen in Table 4, there was a significant main effect of experiential avoidance in predicting perceived stress, $p < .001$; however, when accounting for general distress (i.e., DASS-21 Stress scale), anxiety sensitivity did not significantly predict perceived stress, *ns*. Consistent with Study 1, the anxiety sensitivity x experiential avoidance interaction term significantly predicted perceived stress, $\Delta R^2 = .01$, $p < .001$. As shown, this

interactive effect was robust to the effects of general distress. The effect size of this interaction was small in magnitude (Cohen's $f^2 = .03$; Aiken & West, 1991). Consistent with Study 1, simple slopes analysis (Aiken & West, 1991) revealed that there was no significant association between anxiety sensitivity and perceived stress for participants who reported higher experiential avoidance, *ns.* However, there was a significant positive association between anxiety sensitivity and perceived stress for participants who reported lower experiential avoidance, $B = .08$, $\beta = .16$, $p < .001$, with participants low in experiential avoidance and high in anxiety sensitivity reporting greater perceived stress than participants low in experiential avoidance and low in anxiety sensitivity (see Figure 2).

Predicting anxiety and depression. To further examine the specificity of the anxiety sensitivity-experiential avoidance interaction term and perceived stress, the hierarchical regression analysis described above was run two additional times with anxiety and depression serving as outcome variables. As seen in Table 5, there were significant main effects for experiential avoidance and anxiety sensitivity predicting both anxiety and depression, ps $< .001$. In addition, consistent with Kashdan et al. (2008), the anxiety sensitivity x experiential avoidance interaction term significantly predicted anxiety ($\Delta R^2 = .02$, $p < .001$), but not depression, *ns*. The effect size of this interaction was small in magnitude (Cohen's $f^2 = .04$; Aiken & West, 1991). As seen in Figure 3, simple slopes analysis was consistent with the predicted relations. Specifically, there was a significant positive association between anxiety sensitivity and anxiety for participants both high ($B = .16$, $\beta = .55$, $p < .001$) and low in experiential avoidance ($B = .08$, $\beta = .28$, $p < .001$). Moreover, as predicted, the relationship between anxiety sensitivity and anxiety became increasingly stronger as experiential avoidance increased.

Study 2 Discussion

We sought to replicate the pattern of relations among anxiety sensitivity, experiential avoidance, and perceived stress found in Study 1, in a large adult community sample in Study 2. Consistent with Study 1 findings, all of the study variables shared significant positive intercorrelations in Study 2. Moreover, support was again evidenced for experiential avoidance serving as a moderator of the relationship between anxiety sensitivity and perceived stress. As in Study 1, the pattern of Study 2 relations suggest that individuals high in experiential avoidance report relatively higher levels of perceived stress independent of whether or not they were high or low in anxiety sensitivity. However, among individuals low in experiential avoidance, those with higher anxiety sensitivity seem to report higher levels of perceived stress than those with lower anxiety sensitivity.

Importantly, the pattern of effects observed in Study 2 suggests relations among anxiety sensitivity, experiential avoidance, and perceived stress are not better accounted for by general distress. Moreover, the specificity of the pattern of the interactive effect was supported by results indicating that anxiety sensitivity and experiential avoidance evidence a differential pattern of relations with both anxiety and depression in comparison to perceived stress. Specifically, the relationship between anxiety sensitivity and anxiety symptoms became increasingly stronger as experiential avoidance increased. In contrast, although experiential avoidance and anxiety sensitivity demonstrated main effects in the concurrent prediction of depression symptoms, no interactive effect was observed.

General Discussion

Consistent with previous research (e.g., Isyanov & Calamari, 2004; Tull & Gratz, 2008), anxiety sensitivity was positively associated with experiential avoidance and perceived stress.

Moreover, as predicted, experiential avoidance evidenced a strong positive association with perceived stress, suggesting that individuals with high experiential avoidance also tend to have heightened levels of perceived stress. To our knowledge, these are the first empirical studies to report this association. In addition, we found support for our proposal that experiential avoidance moderates the relationship between anxiety sensitivity and perceived stress. However, as described, the pattern of the interactive effect diverged from our original prediction. More specifically, the interaction revealed a significant positive association between anxiety sensitivity and perceived stress at low, but not high, levels of experiential avoidance.

We initially predicted that the relationship between anxiety sensitivity and perceived stress would grow increasingly stronger as experiential avoidance *increased*. This prediction was based on the rationale that among individuals experiencing bodily sensations to which they are highly averse, those with greater acceptance of negative inner states, in comparison to those using maladaptive emotional avoidance, would likely experience relatively lower perceived stress. We further based this prediction on previous research in which it was found that the relationship between anxiety sensitivity and anxiety symptoms was strongest among participants with higher anxiety sensitivity and a greater unwillingness to accept negative emotions (Kashdan et al., 2008).

Interestingly, Kashdan et al. (2008) did not observe this moderation effect when the outcome variable was anhedonic depressive symptoms. Not only did we replicate Kashdan et al.'s findings in Study 2, but we also found that the observed interaction effect in relation to perceived stress was not a function of shared variance with general distress. Taken together, the pattern of relations among anxiety sensitivity, experiential avoidance, and negative affective states (i.e., perceived stress, anxiety, depression) observed in the present study and in the extant

literature (Kashdan et al., 2008; Naragon-Gainey, 2010), suggest that the tendency to avoid aversive bodily sensations is especially likely to heighten only certain types of distress-based symptomatology (i.e., anxiety). In contrast, experiential avoidance, rather than anxiety sensitivity, emerged as particularly important to perceived stress in the present studies.

The discrepancy between our results and our initial prediction may be the result of failing to consider (a) the differences between perceived stress and general anxiety symptoms, and/or (b) contextual factors. Perceived stress accounts for the degree to which one believes that the demands of life exceed the available resources to effectively cope. When one has the perception that the demands outweigh their resources, life may be experienced as unpredictable, overwhelming, and uncontrollable (Cohen et al., 1983). Individuals who have a greater unwillingness to stay in contact with unwanted inner experiences appear to be more likely to perceive their coping resources to be low relative to the demands of life; and thus, the rigors of daily life may be perceived as overwhelming and uncontrollable independent of anxiety sensitivity. However, in this same group of individuals with higher experiential avoidance, anxiety sensitivity would likely be positively associated with anxiety symptoms because anxiety sensitivity appears to be a critical component of the etiology of anxiety symptomatology (Naragon-Gainey, 2010).

Additionally, it may be important to attend to contextual factors when considering study results. For individuals higher in experiential avoidance, anxiety sensitivity may not be associated with the perception that life is overwhelming or uncontrollable because these individuals are more likely to avoid situations/stimuli that may elicit bodily sensations to which they are highly averse. In contrast, individuals with relatively low experiential avoidance would be less likely to avoid these situations. Therefore, those with lower experiential avoidance and

higher anxiety sensitivity would be more likely to experience an escalated fear response and the perception that life events are unpredictable, overwhelming, and uncontrollable.

Taken together, results of the present study suggest that experiential avoidance may play a particularly important role in the development of heightened perceived stress because it engenders coping responses that may leave one with limited resources for dealing with everyday tasks. As noted by Kashdan et al. (2008), "prolonged, inflexible non-acceptance of emotional responses can consume attention, vitality and other resources, leaving fewer resources to cope and thrive in everyday life" (p. 437). In contrast, a response style of flexible acceptance likely leaves one with the cognitive resources necessary for navigating the nuances of life with relative ease, thus resulting in a relatively low level of perceived stress and a higher general stress threshold. This is consistent with evidence that chronic perceived stress induces neurobiological changes in brain structures that result in impaired ability to regulate affective states (Holzel et al., 2010; Liston et al., 2009). Importantly, the neurobiological changes in the brain that are associated with chronic perceived stress appear to be able to be reversed through stress reduction (Holzel et al., 2010; Liston et al., 2009). The present results suggest that acceptance- and mindfulness-based techniques may be particularly important for ameliorating chronic perceived stress, as these types of interventions directly target experiential avoidance. Furthermore, implementation of these interventions may halt the progression of distress from heightened perceived stress to more severe pathology.

The present studies are not without limitations. For example, our reliance on a monomethod assessment likely inflated relations among the study variables. Moreover, the interactive effects explained only a modest amount of variance in perceived stress scores. However, the ΔR^2 associated with the interactive effects observed in the present studies was

consistent with the magnitude of interactive effects observed in prior research examining potential moderators of the relationship between anxiety sensitivity and deleterious outcomes (Kashdan et al., 2008). In addition, a number of constructs have been shown to be related to both experiential avoidance and anxiety sensitivity (e.g., distress tolerance, emotion regulation). These constructs may be important for better understanding the observed relations in the present study, and therefore, should be considered for study inclusion in this line of research in the future. Finally, the cross-sectional nature of our studies precludes conclusions regarding causation. The use of experimental and longitudinal designs in future studies would address the direction of relations among anxiety sensitivity, experiential avoidance, and perceived stress.

The present studies suggest that experiential avoidance may be an important vulnerability factor for the development of heightened stress. Thus, among individuals who experience similar stressful events, those who use maladaptive emotional avoidance as a response style, in comparison to those who can tolerate undesirable inner experiences, likely experience more intense and protracted levels of stress. The identification of experiential avoidance as a risk factor for heightened stress perception may aid in the development of brief acceptance-based interventions to prevent the progression of stress into clinically significant pathology. More specifically, at-risk individuals can be screened and identified for perceived stress through the use of the Perceived Stress Scale during primary care visits, or as part of mass-testing efforts from employers and academic agencies. Individuals reporting high levels of perceived stress can be offered the option of taking part in brief acceptance-based interventions targeting experiential avoidance.

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Table 1

Descriptive Statistics and Correlations for Study 1 Variables

Variables	1	2	3	4	5	6
1. Age (years)	--					
2. Sex (1 = Male, 2 = Female)	-.25***	--				
3. Race/ethnicity (0 = other/1 = non-Hispanic White)	.01	-.11*	--			
4. Anxiety Sensitivity Index-3	.04	-.02	-.11*	.95		
5. Acceptance and Action Questionnaire-II	.00	.08	.04	.43***	.93	
6. Perceived Stress Scale	-.03	.13**	-.05	.33***	.66***	.81
Mean	20.0	1.54	.57	15.4	18.8	18.0
Standard Deviation	2.2	.5	.5	13.0	9.7	6.74
Minimum	18.0	1	0	0	7	0
Maximum	39.9	2	1	54	47	40

Note. Coefficient alphas (where appropriate) are on the diagonal.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Study 1 Regression Analysis with Perceived Stress as the Outcome Variable

Predictor		PSS			
	ΔR^2	Step 1 β	Step 1 t	Step 2 β	Step 2 t
Step 1	.45***				
Race/ethnicity		-.06	-1.66	-.07^	-1.88
Sex		.08*	2.19	.08*	2.16
ASI-3		.05	1.21	.08^	1.80
AAQ-II		.63***	15.13	.64***	15.39
Step 2	.02***				
ASI-3 x AAQ-II				-.14***	-3.57

Note. PSS = Perceived Stress Scale; ASI = Anxiety Sensitivity Index; AAQ = Acceptance and Action Questionnaire.

^p < .08.*p < .05. **p < .01. ***p < .001.

Table 3

Descriptive Statistics and Correlations for Study 2 Variables

Variables	1	2	3	4	5	6	7	8	9
1. Age (years)	--								
2. Sex (1 = Male, 2 = Female)	.10**	--							
3. Race/ethnicity (0 = other/1 = non-Hispanic White)	.21***	.04	--						
4. Anxiety Sensitivity Index-3	-.22***	-.02	-.04	.94					
5. Acceptance and Action Questionnaire-II	-.19***	.03	.02	.66***	.95				
6. Perceived Stress Scale	-.17***	.11**	-.01	.54***	.72***	.90			
7. Dass-21 Anxiety Scale	-.24***	-.07*	-.06	.70***	.65***	.54***	.87		
8. Dass-21 Depression Scale	-.17***	-.01	-.05	.60***	.75***	.71***	.73***	.93	
9. Dass-21 Stress Scale	-.19***	-.01	.01	.63***	.68***	.67***	.76***	.77***	.90
Mean	34.1	1.6	.8	22.0	21.9	17.9	4.4	6.0	6.7
Standard Deviation	12.5	.7	.4	16.2	11.0	8.2	4.7	6.1	5.5
Minimum	18	1	0	0	7	0	0	0	0
Maximum	73.6	2	1	72	49	40	21	21	21

Note. Coefficient alphas (where appropriate) are on the diagonal. DASS-21 = Depression, Anxiety, Stress Scales.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 4

Study 2 Regression Analysis with Perceived Stress as the Outcome Variable

Predictor		PSS			
	ΔR^2	Step 1 β	Step 1 t	Step 2 β	Step 2 t
Step 1	.59***				
Age		-.03	-1.11	-.03	-1.05
Sex		.10***	4.36	.10***	4.33
ASI-3		.01	0.28	.05	1.54
AAQ-II		.49***	14.74	.49***	15.03
Dass-21 Stress		.33***	10.17	.33***	10.25
Step 2	.01***				
ASI-3 x AAQ-II				-.12***	-5.12

Note. PSS = Perceived Stress Scale; ASI = Anxiety Sensitivity Index; AAQ = Acceptance and Action Questionnaire; DASS-21 Stress = Stress scale of the Depression, Anxiety, Stress Scales.

***$p < .001$.

Table 5

Study 2 Regression Analyses with Anxiety and Depression as Outcome Variables

Predictor	Anxiety					Depression				
	ΔR^2	Step 1 β	Step 1 t	Step 2 β	Step 2 t	ΔR^2	Step 1 β	Step 1 t	Step 2 β	Step 2 t
Step 1	.56***					.58***				
Age		-.08**	-3.16	-.08**	-3.31		-.01	-0.41	-.01	-0.44
Sex		-.06**	-2.86	-.06**	-2.80		-.03	-1.10	-.03	-1.07
ASI-3		.42***	14.91	.42***	13.25		.18***	6.03	.17***	5.40
AAQ-II		.33***	10.81	.33***	10.97		.63***	20.88	.63***	20.89
Step 2	.02***					.00				
ASI-3 x AAQ-II				.14***	5.66				.04	1.69

Note. ASI = Anxiety Sensitivity Index; AAQ = Acceptance and Action Questionnaire.

**$p < .01$, ***$p < .001$.

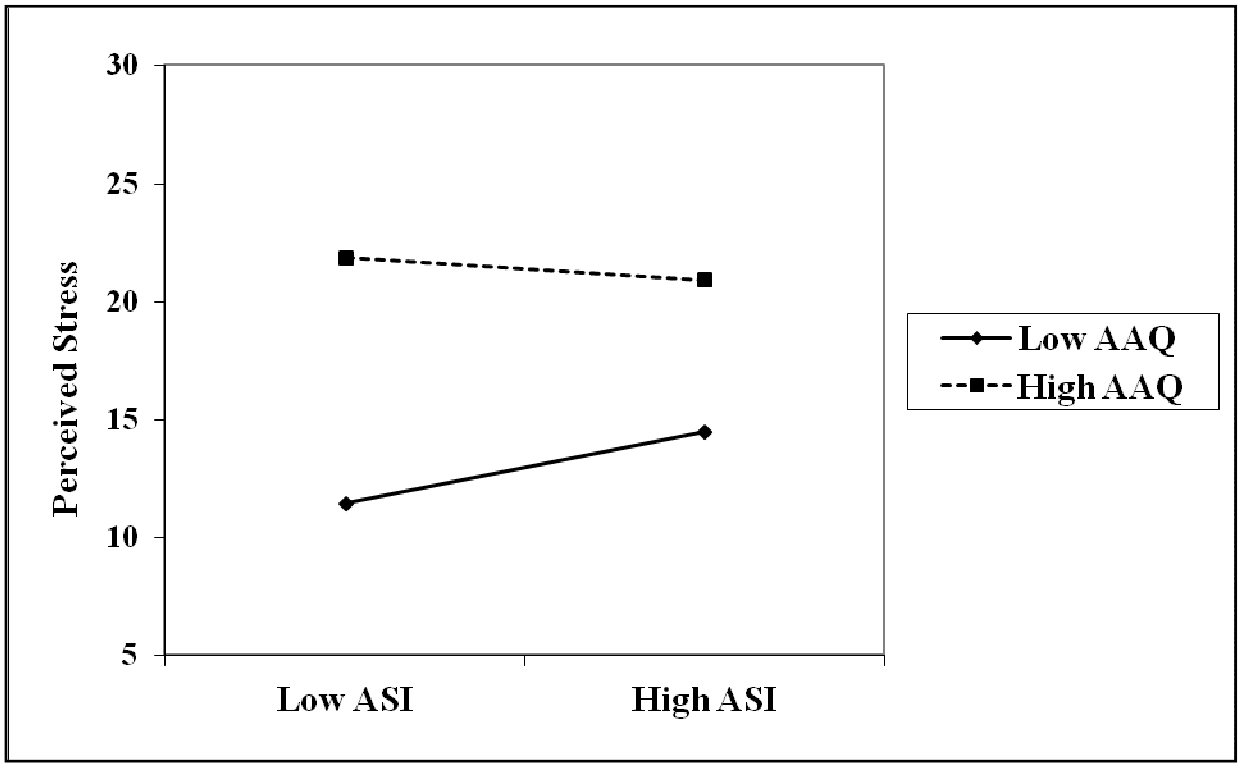

Figure 1. Interaction effect (anxiety sensitivity [ASI] x experiential avoidance [AAQ]) predicting perceived stress, $\beta = -.14$, $p < .001$. Simple slopes analysis revealed that participants low in experiential avoidance and high in anxiety sensitivity reported greater perceived stress than participants low in experiential avoidance and low in anxiety sensitivity. There was no significant association between anxiety sensitivity and perceived stress among participants reporting higher experiential avoidance.

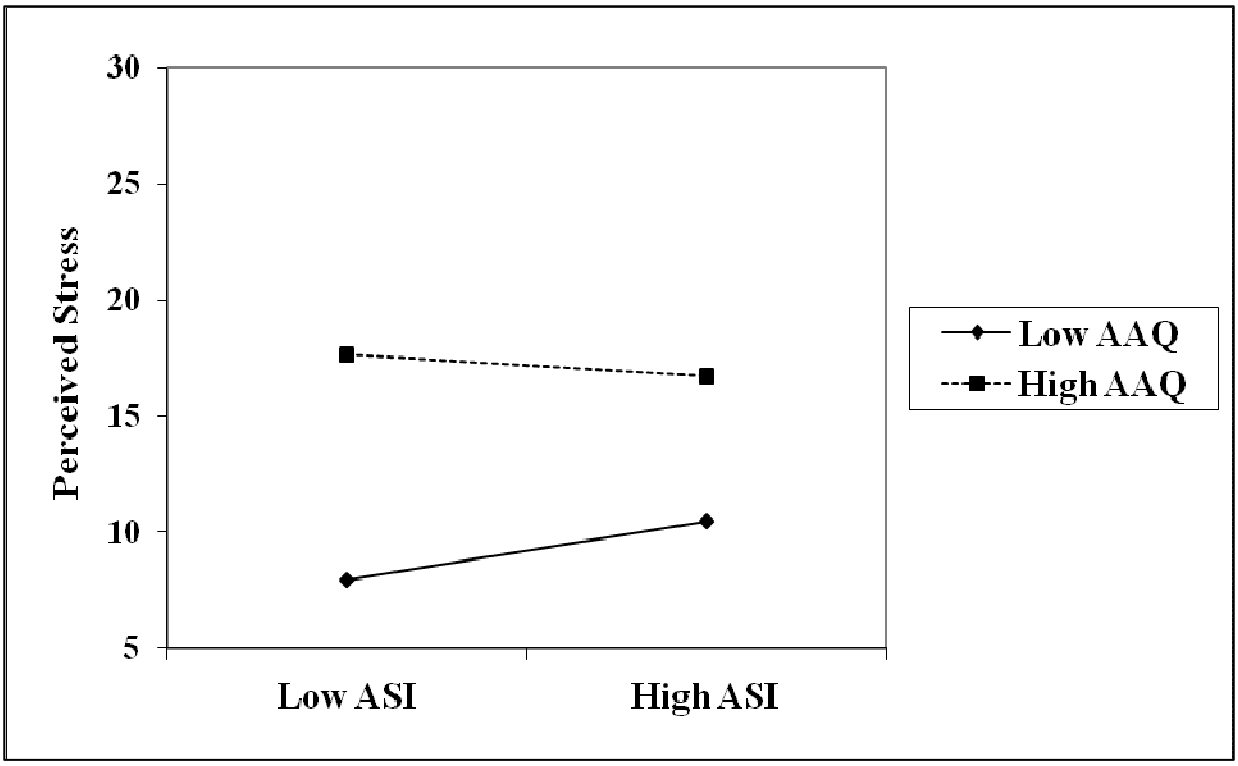

Figure 2. Interaction effect (anxiety sensitivity [ASI] x experiential avoidance [AAQ]), controlling for general distress, predicting perceived stress, $\beta = -.12$, $p < .001$. Simple slopes analysis revealed that participants low in experiential avoidance and high in anxiety sensitivity reported greater perceived stress than participants low in experiential avoidance and low in anxiety sensitivity. There was no significant association between anxiety sensitivity and perceived stress among participants reporting higher experiential avoidance.

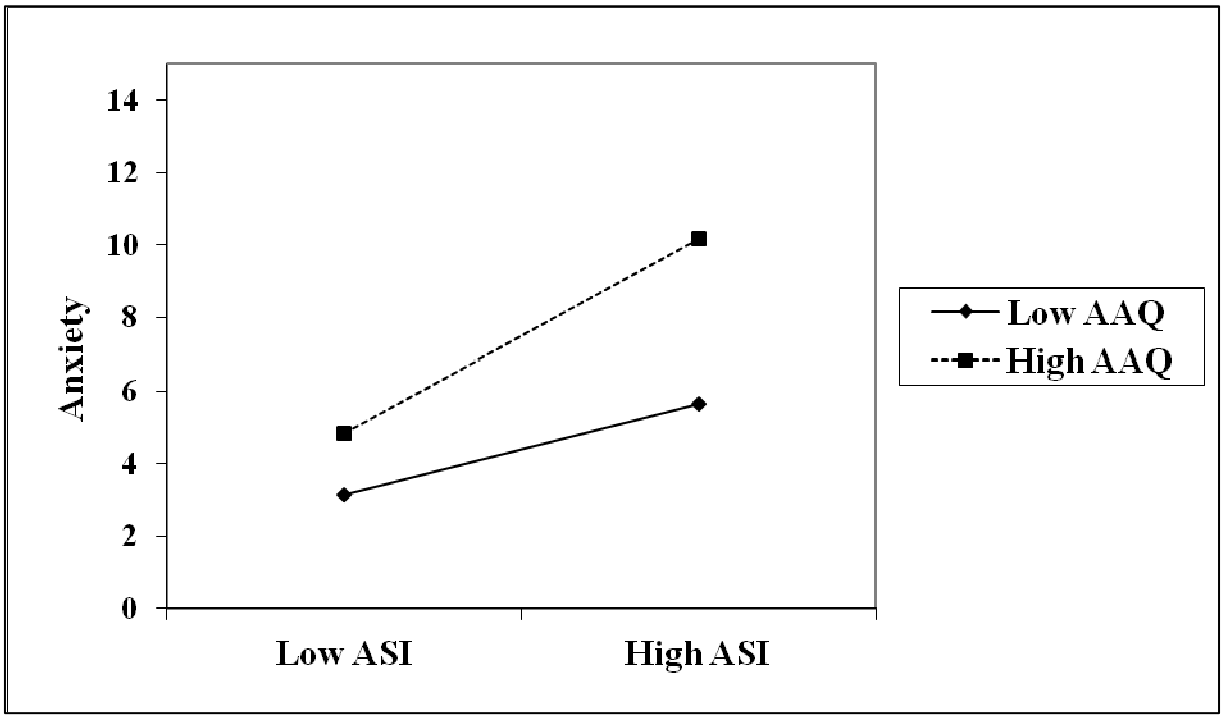

Figure 3. Interaction effect (anxiety sensitivity [ASI] x experiential avoidance [AAQ]) predicting anxiety (DASS-21 Anxiety scale), $\beta = .14$, $p < .001$. Simple slopes analysis revealed that the relationship between anxiety sensitivity and anxiety became significantly stronger as experiential avoidance increased.