

INCREMENTAL VALIDITY OF PSYCHOLOGICAL FLEXIBILITY, ANXIETY
SENSITIVITY, AND MINDFULNESS IN THE PREDICTION OF PANIC DISORDER
SYMPTOMOLOGY AND LIFE SATISFACTION

A Thesis
by
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Abstract

INCREMENTAL VALIDITY OF PSYCHOLOGICAL FLEXIBILITY, ANXIETY SENSITIVITY, AND MINDFULNESS IN THE PREDICTION OF PANIC DISORDER SYMPTOMOLOGY AND LIFE SATISFACTION

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Cognitive behavioral therapy (CBT) is a psychotherapeutic approach that has been demonstrated to be effective in the treatment of panic disorder. Reducing the fear of anxiety-related sensations (anxiety sensitivity) is a core putative mechanism of CBT for panic disorder. Acceptance and Commitment Therapy (ACT) is a transdiagnostic therapy approach considered to be part of the “third wave” CBT movement, sharing some similarities with traditional CBT but differing in many key aspects. ACT has attracted interest and generated debate in academic and clinical domains. Research suggests that ACT is an efficacious treatment in the context of panic disorder and other anxiety-related disorders. However, the incremental utility of ACT-related constructs (e.g., psychological flexibility, mindfulness) relative to traditional CBT-related constructs (e.g., anxiety sensitivity) in the prediction of panic symptomology and life satisfaction is unclear. The few results that exist in this area have been mixed. The present study found anxiety sensitivity and psychological flexibility supplemented one another in the prediction of panic disorder symptoms and life satisfaction.

Mindfulness was not a significant predictor of either panic or life satisfaction. The results suggest that both traditional and third wave CBT constructs (i.e., anxiety sensitivity and psychological flexibility) are useful predictors of panic symptoms and life satisfaction. The results are discussed in the context of previous research along with the study's implications. In addition, recommendations for future research are given.

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Introduction

Incremental Validity of Psychological Flexibility, Anxiety Sensitivity, and Mindfulness in the Prediction of Panic Disorder Symptomology and Life Satisfaction

Panic disorder is an anxiety disorder characterized by recurrent, unexpected panic attacks, anticipatory anxiety of future attacks and their consequences, and maladaptive behavior change (such as avoidance) that can be attributed to the attacks (American Psychiatric Association, 2013). Panic disorder boasts a lifetime estimated prevalence rate of 4.7% (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005) and is associated with significant decreases in quality of life (Olatunji, Cisler, & Tolin, 2007). In addition, it often results in high monetary costs due to medical utilization and lost productivity to individuals (Batelaan et al., 2007) and societal costs estimated in excess of \$42 billion annually in the United States (Greenberg et al., 1999). As such, the identification of effective treatments and factors that contribute to the development and maintenance of panic disorder is a topic of importance to researchers in the fields of psychopathology and medicine, as well as clinicians who treat individuals with panic and other anxiety-related problems.

Decades of basic and applied psychological research have led to a greater understanding of the psychopathology of panic disorder, resulting in theoretical accounts that often inform psychological treatment. Modern learning theories of panic disorder are one such example. Modern learning theories (e.g., Acheson, Forsyth, Prenoveau, & Bouton, 2007; Bouton, Mineka, & Barlow, 2001) posit that panic disorder results from conditioning of anticipatory anxiety, and sometimes panic itself, to internal (e.g., increased heart rate) and external (e.g., public places) stimuli. In addition, these theories assert that certain vulnerability factors predispose a person to the development of panic disorder, including

general biological factors (i.e., genetic predisposition toward being anxious, trait anxiety, or neuroticism), general psychological factors (e.g., childhood mastery experiences over one's environment) and specific psychological factors (e.g., vicarious learning, anxiety sensitivity).

Anxiety Sensitivity (AS), or the fear of anxiety-related body sensations due to faulty beliefs that they are dangerous or have negative consequences (e.g., rapid or irregular heart rate is a sign of cardiovascular sickness, Taylor et al., 2007), is one specific psychological vulnerability that has been shown to increase risk for the development and maintenance of panic disorder and other anxiety disorders (e.g., Schmidt, Lerew, & Jackson, 1997, 1999). Anxiety sensitivity is often conceptualized as a trait-like construct (Taylor et al., 2007; Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012) or learned behavior or set of behaviors produced by negative appraisal of panic-related body sensations as physically harmful (Bouton et al., 2001). Dixon, Sy, Kemp, and Deacon (2013) conducted a study demonstrating that experimentally manipulating beliefs about the dangerousness of anxiety-related body sensations (i.e., by providing false feedback during a hyperventilation task) caused an increase in self-reported panic symptoms (e.g., higher peak anxiety during the task, greater engagement in avoidance). The authors concluded that successful treatment or prevention of panic disorder should ideally include interventions directed at disconfirmation of these sorts of beliefs. Cognitive behavioral therapy (CBT) attempts to directly address and challenge negative appraisals of bodily sensations characteristic of high AS that are frequently endorsed by individuals with panic disorder.

To date, empirically supported treatments (ESTs) for panic disorder include certain psychopharmacological agents (e.g., antidepressants, benzodiazepines) and CBT (McHugh, Smits, & Otto, 2009). A broad term, CBT refers to a family of scientifically-grounded

psychotherapies that have demonstrated efficacy in a wide range of psychological conditions (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). According to some CBT models of anxiety, high anxiety sensitivity is a cognitive vulnerability factor for anxiety disorders and is a target for intervention in CBT. For example, fear of sensations associated with shortness of breath may lead a cognitive behavioral therapist to use intervention strategies that would actively challenge beliefs regarding an inability to breathe. A traditional CBT therapist might ask a client to participate in several exposure exercises designed to elicit physiological responses commonly associated with shortness of breath/suffocation (e.g., breathing through a thin straw or hyperventilation). The proposed function of exposure depends on the conceptualization. In traditional cognitive therapy, a “behavioral experiment” of this nature is performed to test hypotheses and facilitate challenging a maladaptive thought. From a traditional behavioral perspective, exposure often serves to weaken associative learning between arousal sensations and anxiety and/or panic.

Anxiety sensitivity and CBT are well established subjects of research pertaining to panic disorder and other anxiety disorders. However, new treatment approaches related to traditional CBT are emerging and accumulating interest in both clinical and academic circles. These relatively newer approaches are often referred to collectively as the *third wave* of CBT. The first and second “waves” refer to traditional behavior therapy and modern cognitive behavioral therapy respectively. Acceptance and Commitment Therapy (ACT) is a third wave therapy approach that has garnered considerable attention in the past decade (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013; Hofmann & Asmundson, 2008).

One of the many distinctions to be made between ACT and traditional CBT is the disputed causal role of maladaptive beliefs (such as those associated with high AS) in the etiology and maintenance of psychological distress and the implications this has for treatment. Cognitive explanations of panic posit that catastrophic misinterpretations of anxiety-related body sensations are essential to the etiology and maintenance of panic disorder (e.g., Clark, 1986), and interventions are aimed at challenging or correcting such maladaptive thoughts. In contrast, ACT theorists claim that cognitive interventions designed to actively change maladaptive cognitions (e.g., cognitive restructuring) do not supplement behavioral interventions such as exposure to feared stimuli. Longmore and Worrell (2007) conducted a review of CBT component studies to investigate the additional therapeutic contribution of cognitive change interventions to other (primarily behavioral) interventions in the context of depression and anxiety disorders. The authors concluded that there was little to no evidence that cognitive change interventions added significant benefit to behavioral interventions. This is consistent with ACT, which proposes that direct cognitive or emotional change (or “control”) strategies are often unhelpful.

ACT is based on Relational Frame Theory (RFT), a psychological theory of language and cognition that was developed in part as an attempt to tie ACT more closely to basic psychological science. RFT posits that relational frames, sets of arbitrarily related stimuli, are the basic building blocks of language and cognition and are resistant to attempts to change or suppress their content. One implication of this resistance is that, from an RFT perspective, thoughts cannot truly be unlearned, and by extension cognitive restructuring is often ineffective (Hayes et al., 2013). Hayes, Luoma, Bond, Masuda, & Lillis (2006) suggest that traditional CBT is somewhat divorced from basic psychological science principles of

cognition and behavior. ACT/RFT posits that the primary cause of psychological suffering (e.g., panic disorder, depression; Hayes et al., 2013) arise from deficits in psychological flexibility (PF) rather than the existence of unhelpful thoughts (Hayes, 2008). Psychological flexibility is broadly defined as “contacting the present moment as a conscious human being, fully and without needless defense...and persisting with or changing a behavior in the service of chosen values.” (Hayes, Strosahl, & Wilson, 2012, p. 63)

Psychological flexibility is fostered by six core processes that are promoted in ACT (Hayes et al., 2006; 2013). The first of the six core processes is acceptance, which is defined as the tendency to embrace private events (e.g., cognitions, emotions, pain) without unnecessary defense or avoidance. The second is cognitive defusion, the process of changing the function of thoughts by trying to reduce their literal quality. This is facilitated through exercises designed to change the relationship with (not content of) one’s thoughts, which may take the form of recognizing thoughts as being “just thoughts” rather than reality. A client who is experiencing distress regarding tightness in their chest may be asked to observe and state out-loud “I am having the thought that I will choke.” The third process is referred to as “contact with the present moment,” which is defined as flexible, non-judgmental noticing of one’s thoughts and private experiences (e.g., anxiety related body sensations). Self as context, the fourth core process, is the process of engendering awareness of consciousness as being separate from internal events. The fifth core process of ACT is the identification and subsequent pursuit of chosen values – desirable life directions that are intrinsically reinforced but unattainable as an end. The final ACT process is committed action, defined as taking actions concordant with chosen values and widening artificially restricted behavioral repertoires. Most effective behavior change strategies (e.g., those utilized in behavior

therapy or CBT) are compatible with this goal. For example, exposure might represent committed action for a client who wishes to overcome difficulties with anxiety. It is important to note that fear reduction is not a primary aim of exposure in the context of ACT. In this context, exposure would be utilized in an attempt to facilitate practice experiencing anxiety without “needless defense” or avoidance strategies for the purpose of reengagement with valued living. These six processes together make up the overarching construct of PF, each considered vital to ACT, with none afforded greater importance than any of the others.

In addition to PF, broadly defined, ACT and other therapeutic approaches incorporate elements of mindfulness (and strategies for remediating deficits therein) as part of their respective models of treatment (Hayes et al., 2006). Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) define mindfulness as “bringing one’s complete attention to the experiences occurring in the present moment, in a nonjudgmental or accepting way.” (p. 27) Mindfulness is also an important component in other third wave treatments like Dialectical Behavior Therapy (DBT) and Mindfulness-Based Cognitive Therapy (MBCT). Mindfulness is not a component that is typically included in traditional CBT models or treatment protocols.

There is debate in the literature regarding the methodological rigor and the extent to which ACT represents a unique CBT approach (e.g., Hayes, 2008; Hofmann & Asmundson 2008; Gaudiano, 2009; Leahy 2008; Öst 2008); however, accumulating research appears to support the efficacy of ACT-based interventions on panic and other anxiety disorders (e.g., Arch, Eifert et al., 2012; Levitt, Brown, Orsillo, & Barlow, 2004; Meuret, Twohig, Rosenfield, Hayes, & Craske, 2012). Meuret and colleagues (2012) tested a brief ACT intervention (4 sessions) coupled with exposure therapy (6 sessions) for patients with panic disorder (with or without agoraphobia, $N = 11$, 100% female, 72.7% Caucasian). Results

revealed significant increases in mindfulness and decreases in AS and panic disorder severity from baseline to post-intervention, though it is important to note that the study did not include an exposure-only control condition, and thus it is unclear whether the change was attributable to the inclusion of ACT-specific techniques or the use of well-established exposure treatment methods. Levitt, Brown, Orsillo, and Barlow (2004) conducted a study comparing the effects of two emotion regulation strategies, acceptance and suppression. Individuals in the acceptance group were less anxious and less avoidant of an anxiety-provoking task than the suppression group.

Arch, Eifert, and colleagues (2012) conducted a randomized controlled trial comparing ACT and CBT in the context of anxiety disorders in general. Patients ($N = 128$, 52% female, 67% Caucasian) with one or more anxiety disorders were randomly assigned to receive CBT or ACT. CBT was composed of assessment, self-monitoring, psychoeducation, cognitive restructuring, hypothesis testing, breathing retraining and exposure (e.g., interoceptive, imaginal, in-vivo) focused on anxiety reduction. ACT was composed of psychoeducation, experiential exercises, discussion of acceptance, creative hopelessness (exploring prior coping strategies and evaluating their efficacy), and valued action. General findings indicated equivalence on most primary outcome measures; however, the CBT group reported higher scores on quality of life measures and the ACT group reported higher psychological flexibility. However, Arch, Wolitzky-Taylor, Eifert, and Craske (2012) found that cognitive defusion mediated change in quality of life scores, which the authors noted was a stronger mediator than AS. The authors note that according to an ACT perspective, higher scores on quality of life measures could be indicative of increases in value-driven behavior, which Hayes and colleagues (2013) claim takes priority over symptom reduction.

While treatment studies are important in the evaluation of different psychotherapeutic approaches, the underlying constructs and mechanisms believed to be responsible for therapeutic change must also be thoroughly investigated. Given the increasing interest in newer psychotherapy approaches like ACT and constructs such as PF and mindfulness, further research is needed to determine the incremental validity of these constructs compared to well-established factors such as AS. Previous research into the predictive utility of PF for panic and agoraphobia symptoms after controlling for AS have yielded mixed findings (e.g., Berman, Wheaton, McGrath, & Abramowitz, 2010; Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011).

Berman et al., (2010) conducted a study investigating the incremental validity of PF in the prediction of anxiety symptoms. Participants consisted of 42 individuals who met criteria for an anxiety disorder according to the Anxiety Disorders Interview Schedule (ADIS; Brown, Di Nardo, & Barlow, 1994). Hierarchical regression analyses indicated that Acceptance and Action Questionnaire-II scores (AAQ-II, a measure of PF) did not explain significant additional variance in Beck Anxiety Inventory (BAI) scores when controlling for Anxiety Sensitivity Index-3 (ASI-3, a measure of AS) and Beck Depression Inventory (BDI-II) scores. However, ASI-3 scores predicted significant unique variance in BAI scores above and beyond the AAQ-II and BDI-II. The authors suggested that the presence of maladaptive beliefs about the danger of anxiety sensations appear to predict anxiety above and beyond PF, and CBT techniques that target AS would likely be more effective in the treatment of anxiety disorders than ACT-specific techniques that target PF.

In a similar study, Gloster et al. (2011) investigated the incremental validity of PF above AS and neuroticism in the prediction of functioning and impairment among a sample

of individuals diagnosed with panic disorder with agoraphobia (made with administration of ADIS, $n = 368$) and individuals with clinically significant symptoms of social anxiety disorder ($n = 209$). Multiple regression analyses revealed that AAQ-II scores accounted for unique variance in overall anxiety symptoms and functioning but did not explain unique variance in endorsement of panic symptoms or agoraphobic avoidance. Additional variance in impairment across three domains (daily life, free time, and social contact) was explained by AAQ-II scores for the social anxiety sample. While PF did not explain unique variance in all constructs that it was hypothesized it would, the results of Gloster and colleagues' (2011) investigation stands in contrast to the null findings of Berman and colleagues (2010).

Vujanovic, Zvolensky, Bernstein, Feldner, and McLeish (2007) found that an interaction between AS and mindfulness predicted symptoms of anxious arousal and agoraphobic fear better than either construct alone. A community sample was recruited in the state of Vermont ($N = 248$) and asked to complete a battery of the measures relevant to the study at hand. Participants completed the Anxiety Sensitivity Index (ASI), Mindful Attention Awareness Scale (MAAS), Mood and Anxiety Symptom Questionnaire (MASQ), Agoraphobic Cognitions Questionnaire (ACQ), and the Body Vigilance Scale (BVS), which assesses focus on potentially troubling body sensations. Multiple hierarchical regression analyses were performed, indicating that an interaction between mindfulness and AS significantly predicted anxious arousal and agoraphobic cognitions. Because mindfulness is an important component of ACT, as well as other third wave approaches, these findings are important in that they suggest incremental validity of the mindfulness construct in the prediction of scores on panic and agoraphobia related measures.

Given the conflicting findings, it is unclear whether PF provides incremental validity in predicting anxious or panic disorder symptoms (e.g., Berman et al., 2010; Gloster et al., 2011). In addition, only one study to date has examined whether mindfulness exhibits incremental validity in the prediction of panic-related symptomology (Vujanovic et al., 2007), and researchers have yet to compare the predictive utility of AS, PF, and mindfulness for panic symptomology in the same study. Thus, the proposed study seeks to contribute to and expand on previous research by using AS, PF and mindfulness to predict symptoms of panic disorder (which, for the purposes of this study includes panic related impairment, avoidance, etc.) and overall life satisfaction. Life satisfaction was included as a broad measure of well-being separate from traditional measures of psychiatric symptoms. It was hypothesized that PF, mindfulness, and AS would all be incrementally valid predictors of both panic disorder symptoms and overall life satisfaction after controlling for the other predictor variables.

Method

Participants

Study participants consisted of 262 workers from Amazon's Mechanical Turk (MTurk) who resided in the United States (see Table 1). Participants ranged in age from 19 to 74 ($M = 39.2$, $SD = 13.8$) and were predominately Caucasian ($n = 214$; 81.7%) and female ($n = 147$; 56.1%). Participation was voluntary. The proposed study was approved by the Institutional Review Board (IRB) at Appalachian State University (see Appendix A).

Procedures

Participation was solicited through MTurk describing the survey as an opportunity for individuals to answer questions about themselves in exchange for a small payment (\$0.40). Informed consent was explained and obtained via an electronic form (see Appendix B).

Participants were instructed to complete the survey items electronically. All study measures were to be completed in a single session lasting approximately 15 minutes.

Measures

The Anxiety Sensitivity Index-3 (ASI-3) is an 18-item self-report measure that assesses a global AS factor, and three lower order factors: Physical, Cognitive, and Social Concerns (Taylor et al., 2007). Respondents rate their agreement with each item (e.g., “It is important for me not to appear nervous”) on a five-point Likert scale, ranging from 0 = *Very Little* to 4 = *Very Much*. Higher scores on the ASI-3 Physical subscale for individuals with panic disorder relative to those with other anxiety disorders provides evidence for criterion related validity consistent with the theoretical prediction that people with panic disorder would be more disturbed by anxiety-related physical sensations than others, including other individuals with anxiety disorders (see Taylor et al., 2007; Wheaton et al., 2012, for a detailed discussion of the measure’s validation). The ASI-3 demonstrated excellent internal consistency in previous research ($\alpha = .93$, Wheaton et al., 2012) and in the present study ($\alpha = .92$). Refer to Table 2 for correlations among study measures.

The Acceptance and Action Questionnaire (AAQ-II) is a 7-item measure of psychological flexibility, the core construct of the ACT model of psychopathology (Bond et al., 2011). Respondents rate how true each item is for them (e.g., “I’m afraid of my feelings”) on a seven-point Likert-type scale, ranging from 1 = *Never True* to 7 = *Always True*. Psychometric research has indicated that the AAQ-II is a unidimensional measure, and internal consistency ($\alpha = .84$) and test-retest reliability are good (12 months, $r = .79$, Bond et al., 2011). The AAQ-II was highly internally consistent in the present study ($\alpha = .93$).

The Mindful Attention Awareness Scale (MAAS) is a 15-item, single-factor measure (Brown & Ryan, 2003) of mindfulness. Respondents rate each item on a six-point Likert-type scale ranging from *1 = Almost Always* to *6 = Almost Never* with regard to how true each item is for them (e.g., “I find myself doing things without paying attention”). Higher scores indicate greater levels of mindfulness. Internal consistency ($\alpha = .80-.87$) and test-retest reliability (ICC = .81) have been found to be good. The MAAS exhibited excellent internal consistency in the present study ($\alpha = .94$).

The Panic Disorder Severity Scale-Self-Report (PDSS-SR; Houck, Spiegel, Shear, & Rucci, 2002) is a self-report measure designed to assess the presence and/or severity of panic disorder symptomology by asking a series of questions of the respondent, such as: “How many panic and limited symptoms attacks did you have during the week?” The measure contains nine multiple-choice items on a five-point Likert-type scale, ranging from *0 = negligible symptoms or impairment* to *4 = extreme severity of symptoms or impairment*, with higher total scores indicating higher distress caused by panic disorder symptoms. The PDSS-SR is the self-report version of the PDSS, a measure with an empirically derived cutoff score of eight that indicates the presence of panic disorder with sensitivity of 83% and specificity of 64% (Shear et al., 2001). The PDSS-SR is internally consistent ($\alpha = .92$) and produces scores that are stable over time (ICC = .81). The PDSS-SR was highly internally consistent in the present study ($\alpha = .92$).

The Satisfaction with Life Scale (SWLS) is a five-item measure of life satisfaction, the subjective appraisal of one’s current life circumstances relative to a freely-chosen standard or ideal (Diener, Emmons, Larsen, & Griffin, 1985). Items (e.g., “So far I have gotten the important things I want in life”) are rated on a seven-point Likert-type scale,

ranging from 1 = *Strongly Disagree* to 7 = *Strongly Agree*, with higher scores being indicative of higher life satisfaction. The SWLS is internally consistent ($\alpha = .87$) and stable over time ($r = .82$) during its initial validation (Diener et al., 1985) and was highly internally consistent in the present study ($\alpha = .93$). The SWLS demonstrated moderate to strong correlations with multiple measures of subjective well-being in a series of studies investigating its convergent validity (see Diener et al., 1985).

Data Analytic Strategy

Zero-order correlations were computed to examine the relation among the predictor variables (anxiety sensitivity, mindfulness, and psychological flexibility) and outcome variables (panic symptomology and life satisfaction). Three pairs of hierarchical regression analyses (six analyses in total) were conducted to determine the incremental validity of ASI-3, AAQ-II and MAAS scores (above and beyond the others) in the prediction of PDSS-SR and SWLS scores.

Each analysis followed the same basic structure. The first entry in each regression was a block comprised of demographic variables (age and sex) to control for extraneous relationships among these and the variables of interest. The second block contained two predictor variables (e.g., ASI-3 + AAQ-II scores) to control for their combined predictive utility before entering the final block. The third and final block contained the remaining predictor (e.g., MAAS scores) to examine the incremental validity above and beyond the two previously entered variables. For the purposes of this study, incremental validity was defined as a statistically significant ($p < .05$) change in variance accounted for (ΔR^2) from the second to third model as a result of the addition of the third variable. Three hierarchical regression

analyses were performed for each outcome variable (PDSS-SR and SWLS scores), yielding a total of six separate regression analyses.

Results

Zero-Order Correlations

Zero-order correlations were computed to examine the relationship among study variables (see Table 3). AAQ-II, ASI-3, and MAAS scores were significantly correlated with one another (all $ps < .01$) as well as with panic symptom endorsement (all $ps < .05$). AAQ-II and ASI-3 scores were also significantly correlated with SWLS scores (all $ps < .05$); however, MAAS and SWLS scores were not significantly related ($p = .12$). The two outcome variables, PDSS-SR and SWLS scores, were significantly correlated with one another as well ($p < .01$).

Regression Analyses

Demographics. The first step in each analysis was the entry of a block containing age and gender to control for demographic factors. Demographic variables accounted for a small, yet statistically significant amount of variance in panic disorder symptoms ($R^2 = .03$, $p = .03$), but were not significant in predicting life satisfaction ($p = .55$).

Mindfulness. In the two analyses in which mindfulness (MAAS) scores were entered as the third and final step, anxiety sensitivity (ASI-3) and psychological flexibility (AAQ-II) scores were entered as the second step after entering demographics. In the final block, MAAS scores did not account for significant variance in panic disorder symptoms ($\Delta R^2 < .01$, $p = .19$) or life satisfaction ($\Delta R^2 < .01$, $p = .77$) beyond the variables entered in previous blocks.

Anxiety sensitivity. In the two analyses in which ASI-3 scores were entered as the third and final step, MAAS and AAQ-II scores were entered as the second step after entering

demographics. ASI-3 scores accounted for significant incremental variance in the prediction of panic disorder symptoms ($\Delta R^2 = .05, p < .01$) and life satisfaction ($\Delta R^2 = .02, p < .01$) beyond the previous blocks.

Psychological flexibility. In the two analyses in which AAQ-II scores were entered as the third and final step, MAAS and ASI-3 scores were entered as the second step after entering demographics. AAQ-II scores accounted for significant incremental variance in the prediction of panic disorder symptoms ($\Delta R^2 = .10, p < .01$) and life satisfaction ($\Delta R^2 = .20, p < .01$) beyond the previous blocks. Refer to Tables 4 and 5 for complete regression analysis results.

All predictor variables combined accounted for 36.3% of the variability in panic disorder symptom scores and 23.1% of the variance in life satisfaction scores. See Tables 4 and 5 for a detailed breakdown of all six regression analyses. Only ASI-3 and AAQ-II scores were significant predictors of panic disorder symptoms ($ps < .01$) in the final models. Participant age, ASI-3, and AAQ-II scores were the only significant predictors in the final models of life satisfaction ($ps \leq .01$). Post-hoc analyses indicated that mindfulness (as measured by the MAAS) was not a significant predictor of either outcome (i.e., PDSS and SWLS, $ps > .08$) after controlling for age and gender, suggesting shared variance with the other predictors (AS and PF) did not account for its (lack of) potency as a predictor.

Discussion

Panic disorder and other anxiety disorders are destructive, at both the individual and societal level (Batelaan et al., 2007; Greenberg et al., 1999; Olatunji et al., 2007). Previous research has provided evidence for the efficacy of both CBT and ACT in the treatment of panic and other anxiety disorders (Arch, Eifert et al., 2012, Hofmann et al., 2012). However,

research dedicated to treatment mechanisms and factors influencing the maintenance and/or development of pathological anxiety are complementary to comparisons of different treatment approaches. The current study sought to compare the incremental predictive utility of AS, PF, and mindfulness for symptoms of panic disorder and life satisfaction. Results indicated that PF and AS added significant incremental predictive power for models predicting panic symptomology and life satisfaction above and beyond each other, mindfulness, and demographic variables (i.e., age and gender). Mindfulness did not make unique contributions to variance accounted for by AS and PF and was not a significant predictor of either outcome variable. The study hypotheses were partially confirmed, with the exception of mindfulness being a nonsignificant predictor.

Most importantly, given that both PF and AS significantly supplement one other's predictive power, it can be said that both PF and AS are important and account for variability in self-reports of panic disorder symptoms, including impairment and avoidance, and life satisfaction that the other does not. The fact that AS and PF complemented one another in the present study stands in contrast to previous null or mixed findings (e.g., Berman et al., 2010; Gloster et al., 2011).

Berman and colleagues (2010) concluded that PF was not predictive of BAI anxiety scores above and beyond AS while the present study found that PF scores were incrementally predictive of panic disorder symptoms. While Berman and colleagues' (2010) study was concerning anxiety rather than panic, the two are conceptualized by learning theorists as partially overlapping yet partially separate emotional states (Bouton et al., 2001). Anxiety sensitivity is a well-established risk factor for anxiety problems (e.g., Schmidt, Lerew, & Jackson, 1997, 1999), especially panic disorder. Therefore, the fact that AS incrementally

predicted panic disorder symptoms (and anxiety in previous research) is not surprising. With regard to the present study, psychological flexibility was perhaps an important predictor of panic disorder symptoms measured by the PDSS-SR because this measure takes into account avoidance, impairment, and distress related to the attacks (i.e., rather than just the experience of anxiety or panic alone). From an ACT perspective, disengagement from meaningful, vital living and needless defense against one's own experiences (i.e., avoidance and worry about future attacks) would be the "cause" of suffering in the context of the anxiety disorders, not the negative emotional experience or uncomfortable body sensations associated with the attacks themselves. The fact that the PDSS-SR assesses more comprehensive complications associated with panic (e.g., avoidance, impairment) may account for the utility of PF in this context versus its lack of predictive potency in models that examine primarily the emotional experience of anxiety symptoms (i.e., as seen in Berman et al., 2010). In addition, Berman and colleagues (2010) controlled for levels of depression in their hierarchical models. It is possible that PF loses some of its predictive potency when introduced alongside depression, a construct with which it has been found to correlate with in previous research (Bond et al., 2011).

The present study's results partially stood in contrast to those of Gloster et al. (2011). Gloster and colleagues (2011) did not find incremental validity of PF in the prediction of panic symptoms and agoraphobic avoidance, unlike the findings of the present study. These contrasting results are puzzling but could be attributed to the different measures used to examine panic symptoms and their associated complications. However, the fact that PF predicted unique variance in life satisfaction in the present study is congruent with their

finding that PF negatively predicted endorsement of impairment (in social life, free time, etc.), both of which are ACT-consistent.

Hayes and colleagues (2013) noted that the interventions and components of ACT are not undertaken for the reduction of symptoms or to “achieve” some end-state (e.g., “becoming” mindful), but to facilitate reengagement with vital, meaningful living. The definition of values from an ACT perspective as intrinsically-reinforcing, freely chosen, dynamic (i.e., cannot be “achieved”) patterns of behavior (e.g., Hayes et al., 2013) suggests that values are likely highly related to life satisfaction. It is unclear if there is a meaningful difference between engagement in valued life (as defined by ACT) and being highly satisfied with one’s life (i.e., a high score on the SWLS) given that values are individualized and freely-chosen from an ACT perspective. Regardless, it does not seem far-fetched to say that most clients ultimately engage in psychotherapy or other treatments for the purpose of living a more satisfying or meaningful life, but they may perceive their thoughts, feelings, behaviors and/or bodily sensations as obstacle(s) in fulfilling this desire.

In the present study, AS also incrementally predicted life satisfaction beyond PF. While AS is highly related to panic and other anxiety disorders (which likely decrease life satisfaction on their own), the seemingly discrete nature of AS relative to broad constructs like PF makes this finding somewhat surprising and difficult to explain adequately despite being hypothesized. Future research should investigate the possibility that this relationship is mediated by the presence of anxiety-related symptoms or impairment.

There are a number of limitations for the current study. First, the sample was not restricted only to individuals with an anxiety disorder, and the extent to which the present results would extend to clinical samples is unclear. However, it should be noted that the

mean ASI-3 scores in the present sample ($M = 19.47$, $SD = 13.54$) were significantly higher (i.e., $> .75 SD$) than the non-clinical mean reported in previous research (i.e., $M = 12.8$, $SD = 10.6$; Taylor et al., 2007), and mean PDSS-SR scores ($M = 9.37$, $SD = 4.18$) were comparable to the inpatient psychiatric sample to validate the measure (i.e., Houck et al., 2002; $M = 9.0$, $SD = 6.6$). Thus, although the present sample was non-selected for clinically anxious individuals, participant scores suggest that there were likely a relatively high number of individuals who would meet clinical cutoffs. Second, given that an experimental design was not utilized, the study does not provide information about causation, directionality, or potential third variables that account for the relationship among any of the study variables. Third, AS, PF, and mindfulness accounted for 36% of the variance in panic disorder symptoms and 23% in life satisfaction. A multitude of other variables undoubtedly contribute to their variability. Fourth, this study and others like it cannot provide direct information regarding the relative efficacy of CBT or ACT for panic disorder or any other psychological disorder. Previous research has made clear that although CBT and ACT contain different components and have different proposed mechanisms of action, there is overlap in common components (e.g., exposure) and treatment mediators (e.g., anxiety sensitivity and cognitive defusion mediate CBT and ACT; Arch, Wolitzky-Taylor et al., 2012). Fifth, the methodology employed in the current study does not necessarily provide information regarding the relative importance of AS, PF or mindfulness in the prediction of either panic disorder symptoms or life satisfaction. Dominance analysis or relative importance analysis are more appropriate statistical methods to answer this question compared to hierarchical regression.

Despite these limitations, this study contributes to the literature by virtue of being the only study that examines these particular variables' incremental validity in predicting both panic disorder symptoms and life satisfaction. Future research of this kind should supplement traditional symptom or disorder-based measures with measures of broader outcomes (e.g., quality of life, life satisfaction). This approach could theoretically obtain a more comprehensive picture of an individual's functioning.

In addition, future research on the relationship among variables like AS and PF might investigate any unknown subordinate or supraordinate hierarchical structure(s) that may exist. While purely speculative, variables such as psychological inflexibility and AS could be differing expressions of broader, latent constructs such as negative emotionality, neuroticism, or distress tolerance. Akin to some researchers' claims that ACT may be a "repackaging" of traditional CBT, perhaps these variations of vulnerability/maintaining factors for psychopathology are differing, complementary aspects of the same underlying construct. Investigations into the nature of such a construct are certainly beyond the scope of the present study, though if such a construct or putative constructs were identified, it could potentially prove useful in improving the quality of evidence-based psychological services.

Cognitive-Behavioral Therapy and Acceptance and Commitment Therapy are two distinct and reasonably credible, coherent, and scientifically-grounded models of psychopathology and treatment. Comparisons between CBT and ACT appear to be unavoidable; and there has been no shortage of lively, intelligent debate between proponents of traditional CBT and ACT. Discourse of this kind is often useful for moving scientific disciplines like clinical psychology forward. However, a lack of openness to innovation or abandonment of "tried and true" principles of positive behavior change may result if

researchers and clinicians mindlessly align themselves with one paradigm or another. This study, at the very least, demonstrates that these models can help to build upon one another, the “new” and the “old,” to facilitate a more complete understanding of human suffering.

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Table 1
Demographic Characteristics ($M_{age} = 39.2, SD_{age} = 13.8$)

	Percentage	Frequency
Gender		
Men	43.9	115
Women	56.1	147
Race/Ethnicity		
White/Caucasian	81.7	214
African American	8.4	22
Hispanic	2.7	7
Asian	3.1	8
Native American	0.8	2
Pacific Islander	0.4	1
Other	2.7	7
Refused to answer	0.4	1
Total	100.0	262

Table 2
Descriptive Statistics of All Study Measures

	Range	Mean	<i>SD</i>	Internal Consistency (α)
ASI-3	0-65	19.47	13.54	.92
AAQ-II	7-49	20.52	10.73	.93
MAAS	15-90	60.16	16.50	.94
SWLS	5-35	18.62	8.39	.93
PDSS-SR	7-30	9.37	4.18	.92

Table 3

Zero-Order Correlations among All Study Measures

	AAQ-II	MAAS	SWLS	PDSS-SR
ASI-3	.62**	-.26**	.12*	.51**
AAQ-II		-.32**	.42**	.56**
MAAS			-.10	-.12*
SWLS				.15*

Note. * $p < .05$. ** $p < .01$

Table 4
Hierarchical Regressions Predicting PDSS-SR Scores

	β	F	R ²	ΔR^2
Model 1				
Step 1		3.61*	.03	.03*
Age	-.10			
Gender	.13			
Step 2		35.90**	.36	.33**
ASI-3	.28			
AAQ-II	.40			
Step 3		29.15**	.36	<.01
MAAS	.07			
Model 2				
Step 1		3.61*	.03	.03*
Age	-.10			
Gender	.13			
Step 2		29.47**	.31	.29**
AAQ-II	.58			
MAAS	.05			
Step 3		29.15**	.36	.05**
ASI-3	.28			
Model 3				
Step 1		3.61*	.03	.03*
Age	-.10			
Gender	.13			
Step 2		22.85**	.26	.24**
MAAS	<.01			
ASI-3	.51			
Step 3		29.15**	.36	.10**
AAQ-II	.42			

Note. * $p < .05$. ** $p < .01$

Table 5
Hierarchical Regressions Predicting SWLS scores

	B	F	R ²	ΔR ²
Model 1				
Step 1		.61	.01	.01
Age	.05			
Gender	.05			
Step 2		19.23**	.22	.23**
ASI-3	-.20			
AAQ-II	.59			
Step 3		15.36**	.22	<.01
MAAS	.01			
Model 2				
Step 1		.61	.01	.01
Age	.05			
Gender	.05			
Step 2		16.82**	.21	.20**
AAQ-II	.48			
MAAS	.03			
Step 3		15.36**	.23	.02*
ASI-3	-.20			
Model 3				
Step 1		.61	.01	.01
Age	.05			
Gender	.05			
Step 2		1.89	.03	.02*
MAAS	-.08			
ASI-3	.12			
Step 3		15.36**	.23	.20**
AAQ-II	.59			

Note. * $p < .05$. ** $p < .01$

Appendix A

IRB <irb@appstate.edu> Thu, Nov 21, 2013 at 9:50 AM
To: bergquistjj@email.appstate.edu
Cc: bromanfulksj@appstate.edu
To: John Bergquist

CAMPUS MAIL

From: IRB Administration
Date: 11/21/2013
RE: Notice of IRB Exemption
Study #: 14-0109

Study Title: Mood and College Student Well-Being

Exemption Category: (2) Anonymous Educational Tests; Surveys, Interviews or Observations This study involves minimal risk and meets the exemption category cited above. In accordance with 45 CFR 46.101(b) and University policy and procedures, the research activities described in the study materials are exempt from further IRB review.

Study Change: Proposed changes to the study require further IRB review when the change involves:

- an external funding source,
- the potential for a conflict of interest,
- a change in location of the research (i.e., country, school system, off site location),
- the contact information for the Principal Investigator,
- the addition of non-Appalachian State University faculty, staff, or students to the research team, or
- the basis for the determination of exemption. Standard Operating Procedure #9 cites examples of changes which affect the basis of the determination of exemption on page 3.

Investigator Responsibilities: All individuals engaged in research with human participants are responsible for compliance with University policies and procedures, and IRB determinations. The Principal Investigator (PI), or Faculty Advisor if the PI is a student, is ultimately responsible for ensuring the protection of research participants; conducting sound ethical research that complies with federal regulations, University policy and procedures; and maintaining study records. The PI should review the IRB's list of PI responsibilities.

To Close the Study: When research procedures with human participants are completed, please send the Request for Closure of IRB Review form to irb@appstate.edu.

If you have any questions, please contact the Research Protections Office at (828) 262-7981 (Julie) or (828) 262-2692 (Robin).

Best wishes with your research.

Websites for Information Cited Above

Note: If the link does not work, please copy and paste into your browser, or visit <https://researchprotections.appstate.edu/human-subjects>.

1. Standard Operating Procedure #9:

<http://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/IRB20SOP920Exempt%20Review%20Determination.pdf>

2. PI responsibilities:

<http://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/PI20Responsibilities.pdf>

3. IRB forms: <http://researchprotections.appstate.edu/human-subjects/irb-forms>

CC:

Joshua Broman-Fulks, Psychology

Appendix B

Thank you for taking the time to participate in our survey. You will be asked to complete a series of questionnaires about yourself. Your participation in completing this survey is voluntary and you may decide to stop at any time for any reason. In order to participate and be compensated for this survey, you must be over 18 years old and be proficient in English. In addition, you must not have participated in the survey before, you will only be compensated for taking the survey one time.

Your careful and honest participation is required in order for the findings of this study to be useful and valid. If it becomes clear that you responded to survey items in a random, careless or inattentive fashion, you will not receive compensation or approval for your participation. Only participate in the study if you are willing to attend to the survey content.

You will receive \$0.40 for your completion of the survey.

All survey responses will be kept anonymous- and will not be linked to your identifying information (e.g., your name). This survey should not take more than 10-20 minutes.

If you have any questions or concerns about the nature of this research or the survey please contact:

John J. Bergquist, B.A.
Clinical Health Psychology Graduate Student
bergquistjj@appstate.edu

Joshua J. Broman-Fulks, Ph.D.
Associate Professor, Psychology
Faculty Advisor
bromanfulksj@appstate.edu

or

irb@appstate.edu.

By continuing to the survey, I acknowledge that I am at least 18 years old, am proficient in English, have not participated in this survey before, have read, understand and agree to the above information, and provide my consent to participate under the terms above.

Vita

John J. Bergquist was born in Rawlins, WY, to John E. and Nanette S. Bergquist. He graduated from the University of Wyoming in May 2012 with the degree of Bachelor of Arts in Psychology. John commenced work toward a Master of Arts degree in Clinical Health Psychology at Appalachian State University in the fall of 2012. John is a Ronald E. McNair Scholar and has been a member of the Association of Behavioral and Cognitive Therapies (ABCT) since 2011, presenting research at four consecutive conventions during his tenure as an undergraduate and graduate student researcher.