CONFIRMATORY FACTOR ANALYSIS OF THE ANXIETY SENSITIVITY INDEX-3

A Thesis
by
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Foreword

This thesis is written in accordance with the style of the *Publication Manual of the American Psychological Association (6th Edition)* as required by the Department of Psychology at Appalachian State University

Acknowledgments

I would like to thank my thesis chair, Dr. Joshua Broman-Fulks, for his continued patience and guidance throughout this thesis process. Additional thanks are warranted to my dedicated thesis committee, Dr. Shawn Bergman and Dr. Will Canu.

Dedication

I wish to dedicate this thesis to my parents, Peter Zawilinski and Mona Henry, and my brother, Brent Zawilinski. Their enduring support and encouragement has made my graduate school experience possible.

Confirmatory Factor Analysis of the Anxiety Sensitivity Index-3

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Abstract

Anxiety sensitivity, or the fear of anxiety and related physiological sensations, has been found to amplify fears and operates as a risk factor for anxiety and related pathology. Factor analytic research of the original version of the Anxiety Sensitivity Index (ASI) demonstrated that anxiety sensitivity is a multidimensional construct, with the ASI assessing a higher order anxiety sensitivity factor and three lower-order components, including Physical, Cognitive, and Social concerns. Each domain has been shown to be strongly associated with and predictive of particular forms of anxiety and mood pathology. The Anxiety Sensitivity Index -3 (ASI-3), which represents the third in a series of ASI revisions, was developed to comprehensively assess the three components of anxiety sensitivity. The purpose of the present investigation was to elucidate the most theoretically and statistically accurate factor structure of the ASI-3 by testing previously evaluated models of anxiety sensitivity in an undergraduate sample, and extending the findings to a community sample that were administered the ASI-3 as a standalone measure. Measurement equivalence of the ASI-3 among the two samples was also evaluated. Results of confirmatory factor analyses (CFAs) indicated a hierarchical model provided the best fit to ASI-3 data. Findings of the multi-group comparison showed measurement invariance among undergraduates and community residents. Implications of these findings and possible directions for future research are discussed.

Keywords: anxiety sensitivity, ASI-3, confirmatory factor analysis, CFA

Confirmatory Factor Analysis of the Anxiety Sensitivity Index -3

Anxiety sensitivity refers to the fear of anxiety and related physiological sensations due to the interpretation that those sensations will have negative physical, psychological, and/or social consequences (Reiss & McNally, 1985). Individuals with high anxiety sensitivity perceive harmless bodily sensations as catastrophic, such as believing that a rapid heartbeat will lead to a heart attack. Anxiety sensitivity has been found to be a reasonably stable individual difference variable that amplifies fears and serves as a risk factor for the development and maintenance of panic disorder (Ehlers, 1995; Reiss, 1991; Schmidt, Lerew, & Jackson, 1997, 1999). Previous research also indicates that anxiety sensitivity predicts the occurrence of other anxiety disorder diagnoses as well as other Axis I disorders including mood and substance use disorders (Schmidt, Zvolensky, & Maner, 2006).

Anxiety sensitivity was originally conceptualized as a unidimensional construct (Reiss, Peterson, Gursky, & McNally, 1986). Based on this perspective, the Anxiety Sensitivity Index (ASI; Reiss & Peterson, 1987), which has been the most commonly used measure of anxiety sensitivity, was designed with the goal of assessing a single dimension. However, subsequent factor analytic research suggested that anxiety sensitivity is multi-dimensional, with most studies finding that the ASI assesses three domains: Physical, Cognitive, and Social Concerns (Zinbarg, Barlow, & Brown, 1997). The Physical Concerns dimension refers to the fear of a variety of anxiety-related physiological sensations, such as feelings of cardiovascular arousal and hyperventilation. The Cognitive Concerns domain assesses fears of negative psychological outcomes potentially associated with anxiety, including difficulty concentrating and fears of going crazy or losing one’s mind. The Social

Concerns domain refers to the fear or worry that others will notice anxiety related sensations, such as nervousness or shakiness (Peterson & Plehn, 1999).

Previous research has suggested that it may be important to take into account the scores of the three anxiety sensitivity domains due to the strong association and predictive properties each domain has with particular forms of anxiety and mood pathology. Specifically, the domains of anxiety sensitivity have been shown to discriminate among the different anxiety and mood disorders in a manner consistent with their content (Peterson & Plehn, 1999). For example, the Physical Concerns domain of anxiety sensitivity has been found to be strongly associated with and predictive of panic attacks and panic disorder (Blais et al., 2001; Zinbarg et al., 1997; Zinbarg, Brown, Barlow, & Rapee, 2001). A propensity to become alarmed by physiological sensations, as measured by the ASI, may increase a person's probability of experiencing panic attacks, which in turn, may lead to panic disorder (McNally & Lorenz, 1987). In contrast, the Cognitive Concerns domain has been found to be strongly associated with generalized anxiety disorder (GAD) and major depressive disorder (Grant, Beck, & Davila, 2007; Rector, Szacun-Shimizu, & Leybman, 2007). The item content for this domain, such as "When I am nervous I worry that I might be mentally ill," are consistent with the cognitive appraisals of worry and thoughts related to uncontrollable, catastrophic consequences that occur in GAD and have also been found to be associated with depression (Papageorgiou & Wells, 2003). In addition, individuals with social anxiety disorder (SAD) are more likely to have elevations on the Social Concerns subscale (Zinbarg et al., 1997), which assesses the fear of negative evaluation by others, a central criterion for this particular diagnosis as detailed in the *Diagnostic and Statistical Manual of Mental*

Disorders, Fourth Edition, Text Revision (DSM-IV-TR) published by the American Psychiatric Association (2000).

Although the ASI has been the conventional instrument to assess anxiety sensitivity, research has raised concerns about the adequacy of the ASI as a measure of the three components of anxiety sensitivity. Indeed, anxiety sensitivity was originally conceptualized as representing a single dimension, and, thus, the ASI was not designed to assess a multidimensional construct (Taylor et al., 2007). Consistent with this observation, some researchers have documented that the ASI contains too few items to reliably categorize the type or number of lower order components of anxiety sensitivity (Deacon, Abramowitz, Woods, & Tolin, 2003). Factor analytic research indicates that the Physical Concerns subscale contains eight items, whereas the Social Concerns and Cognitive Concerns subscales only include four items each. The inequality of the number of items for each subscale contributes to a lack of reliability (Taylor et al., 2007). The content validity of some of the original ASI items also appears to be deficient, in that some of the items do not target specific anxiety symptoms, but instead may assess more general concerns. For example, it is unclear whether the item, “It scares me when I am nauseous” measures Physical (e.g., fear of physical consequences of nausea) or Social Concerns (e.g., fear of the social consequences of vomiting in front of others). Through item-level analysis, researchers have also found that some ASI items (items 1, 5, 7, & 8; Reiss & Peterson, 1987) demonstrate low item-to-scale correlations. In addition, scores on ASI items 7 and 8 tend to be higher or equivalent in non-diagnosed groups (Blais et al., 2001).

The Anxiety Sensitivity Index-Revised (ASI-R; see Appendix A) is a 36-item, expanded version of the original 16-item ASI, developed to account for the concerns of the

original ASI. Taylor and Cox (1998) constructed the ASI-R by using 10 items from the original ASI and adding 26 new items. The ASI-R retained the instructions and format of the original ASI, and ASI-R items were not organized by the dimensions of anxiety sensitivity they assess. Factor analyses have indicated that the ASI-R has a hierarchical structure, measuring a general anxiety sensitivity construct and four lower order factors: Fear of Respiratory Symptoms, Fear of Publicly Observable Anxiety Reactions, Fear of Cardiovascular Symptoms, and Fear of Cognitive Dyscontrol (Taylor & Cox, 1998). However, the four-factor model originally reported by Taylor and Cox has been consistently found to be unstable in that several studies have uncovered different numbers and/or types of factors. For example, exploratory factor analysis of the ASI-R in a large sample of undergraduates indicated a four-factor solution that consisted of: Beliefs about the Harmful Consequences of Somatic Sensations, Fear of Publicly Observable Anxiety Reactions, Fear of Cognitive Dyscontrol, and Fear of Somatic Symptoms with Explicit Consequences (Deacon et al., 2003). Alternatively, when Zvolensky et al. (2003) administered the ASI-R to a large sample of participants from diverse cultural backgrounds, including individuals from Canada, France, Mexico, the Netherlands, Spain, and the United States, a principle axis factor analysis with oblique rotation indicated that a two-factor solution (Fear of Somatic Complaints and Fear of Social Cognitive Concerns) was most replicable across all groups.

Several confirmatory factor analytic studies have been conducted in an effort to provide clarification regarding the factor structure of the ASI-R, though the results of these studies have failed to provide consistent support for one model. For example, Armstrong, Khawaja, and Oei (2006) concluded that none of the models were an acceptable fit to data collected from a clinical and community sample, though the Taylor and Cox (1998) four-

factor hierarchical model was close to a good fit. Subsequent analyses indicated that a 21-item ASI-R provided the most accurate measure of anxiety sensitivity and its subdomains. A subsequent confirmatory factor analysis (CFA) by Arnau, Broman-Fulks, Green, and Berman (2009) confirmed the good fit for the 21-item ASI-R, but also indicated that the Taylor and Cox factor structure for the 36-item ASI-R provided a good fit after a small number of model modifications were made. Furthermore, scores on the 36-item ASI-R were deemed to be more reliable and valid than the 21-item ASI-R.

Due to the unstable factor structure of the ASI-R, Taylor and colleagues (2007) developed the Anxiety Sensitivity Index-3 (ASI-3; see Appendix B). Items for the ASI-3 were selected from ASI-R items and were chosen only if they corresponded explicitly with a Physical, Cognitive, or Social Concerns domain. To this end, 12 items were removed because it was unclear which of the three domains they assessed, and, in addition, three more items that contained similar language as other items were eliminated. Due to these changes, the original ASI-3 included 21 total items with seven questions assessing each subscale. Initial psychometric analysis indicated that the three-factor model for the 21-item ASI-3 was a good fit on two fit indices, comparative fit index (CFI) = .972 and Tucker-Lewis Index (TLI) = .972, but not on all fit indices, standardized-root-mean-square residual (SRMR) = .085, root mean square error of approximation (RMSEA) = .077. To improve fit, model modification indices were employed to determine the worst fitting items. Items that did not indicate a pure measure of a given factor were identified by examining the greatest drop in chi-square scores if that item was allowed to cross-load on one or both of the other factors. The worst fitting item for each subdomain was dropped from the scale, reducing the ASI-3 to 18 items, or six questions evaluating each subscale. Subsequent analyses demonstrated that all four fit indices

indicated that the three-factor model was a good fit for the 18-item ASI-3 (Taylor et al., 2007).

To further test whether the three-factor model provided the most statistically favorable fit to the data, two alternative models, a one-factor model and a two-factor model, were tested. Previously established in factor analytic research, although not frequently replicated, the one-factor model consisted of all 18 items loading on a single dimension, and the two-factor model was comprised of a Physical Concerns factor and a combined Social-Cognitive Concerns factor (Zvolensky et al., 2003). Results continued to indicate that the three-factor model provided a better fit to the data than the one- and two-factor models, as these alternative models yielded a good fit to the data on only two of four fit indices. In addition, it was anecdotally noted by the authors that goodness-of-fit results for the three-factor model were identical to findings when a hierarchical model was tested with the three first-order factors (i.e., Physical, Cognitive, and Social Concerns) all loading onto one higher-order anxiety sensitivity factor (Taylor et al., 2007).

Following construction of the ASI-3, reliability and validity of the new measure was investigated. The coefficient alpha values computed for each of the ASI-3 domains were in the acceptable (greater than or equal to .70) or good (greater than or equal to .80) ranges (Nunnally & Bernstein, 1994; Taylor et al., 2007). When compared with the original ASI, the ASI-3 Physical Concerns domain had a similar magnitude of reliability. However, the magnitudes of the reliabilities for the Social and Cognitive Concerns domains were significantly higher in the ASI-3 (Taylor et al., 2007). Analyses also indicated that the ASI-3 contained less error variance than the original ASI. Near perfect correlations between ASI-3 subscale scores and corresponding subscale scores on the ASI provided evidence of good

convergent validity. These correlations were, for the most part, significantly higher than those of dissimilar subscales within the ASI and the ASI-3, signifying acceptable discriminant validity. Consistent with prediction, the Physical Concerns domain scores were higher in those with panic disorder than in individuals with other anxiety disorders, whereas the Cognitive Concerns subscale scores were elevated in those with panic disorder and GAD, and the Social Concerns domain scores were higher in individuals with SAD (Taylor et al., 2007). Due to this increased reliability and validity, the ASI-3 provides a more psychometrically sound assessment of the three domains of anxiety sensitivity than previous versions of the measure.

Although the studies conducted by Taylor and colleagues (2007) provided important information regarding the ASI-3, some limitations should be noted. The ASI-3 was created using data almost exclusively derived from undergraduate samples, which contain limited variability in a variety of characteristics (e.g., age, education, intellectual abilities). Specifically, of the 4,720 participants used by Taylor et al. for test construction and validation, 4,616 were undergraduate students. Only one alternative sample (390 clinical patients) was used for validation purposes; thus, the extent to which the ASI-3 factor structure and other positive psychometric properties reported by Taylor and colleagues is generalizable to the broader United States (U.S.) population remains unclear. In addition, nearly half of the patients in the clinical sample were diagnosed using unstructured clinical interviews, which may limit the validity of diagnostic classifications and the resulting conclusions regarding the validity of the ASI-3 (Segal & Coolidge, 2007). Furthermore, in all of the samples employed by Taylor et al. to create and assess the psychometric properties of the ASI-3, the ASI-3 items were extracted from completed ASI-R protocols. Thus, to date,

the psychometric properties of the ASI-3, when administered as a stand-alone instrument, remain untested. Finally, results of confirmatory factor analyses were reported for a three-factor model (i.e., Physical, Cognitive, and Social Concerns), rather than the hierarchical model established by factor analytic research conducted on both the ASI and ASI-R (Arnau et al., 2009; Deacon et al., 2003; Taylor & Cox, 1998; Zinbarg et al., 1997). While noted that results were identical to results found investigating a hierarchical model, it is unclear to what degree these results were the same.

The purpose of the present investigation was to elucidate the most theoretically and statistically accurate factor structure of the ASI-3 by testing previously evaluated models of anxiety sensitivity in an undergraduate sample and by extending the findings to a community sample that was administered the ASI-3 as a standalone measure. To this end, we conducted two studies. The first study used CFA to examine the fit of the hierarchical model, proposed to have identical fit to the three-factor model, in data collected from an undergraduate sample (Taylor et al., 2007; Zinbarg et al., 1997, 2001). In addition, the three-factor model established by Taylor and colleagues (2007) and the originally conceptualized one-factor model, also tested by Taylor et al., 2007, were evaluated (Reiss et al., 1986). Analysis of the factor structure in an undergraduate sample sought to provide confirmatory evidence of the latent structure of the ASI-3 among undergraduate populations. Study 2 aimed to extend previous research by investigating the external validity of the ASI-3 by testing the three proposed models in a community sample. Study 2 also permitted examination of whether administering the ASI-3 as a stand-alone measure, rather than when it is encompassed in the more extensive ASI-R, affected the fit of the three factor model. Following confirmatory

factor analysis in each sample, a multi-group comparison was conducted to test the measurement invariance of the best fitting model.

While studies investigating the latent structure of the ASI-R have shown differing numbers and/or types of lower-order components, findings from factor analytic research of both the ASI and ASI-R have consistently demonstrated a hierarchical factor structure (Arnau et al., 2009; Deacon et al., 2003; Taylor & Cox, 1998; Zinbarg et al., 1997). Thus, in the present study it was hypothesized that the hierarchical model would provide a good fit to ASI-3 data collected from an undergraduate and a community sample and that these groups would be invariant. The current study also assessed the convergent and discriminant validity of the ASI-3 by assessing the relation between ASI-3 scores and theoretically linked anxiety disorder diagnoses (e.g., panic disorder, agoraphobia, posttraumatic stress disorder [PTSD], SAD), measures of related constructs (i.e., fear of body sensations), and constructs not theoretically linked to anxiety sensitivity, such as alcohol consumption (e.g., Novak, Burgess, Clark, Zvolensky, & Brown, 2003; Zack, Poulos, Fragopoulos, Woodford, & Macleod, 2006) and caffeine consumption (e.g., McWilliams & Asmundson, 2001). It was predicted that ASI-3 scores would be highly correlated with related measures but would show little association with measures of constructs not theoretically linked to anxiety sensitivity. It was also hypothesized that, consistent with previous versions of the ASI, ASI-3 scores would be significantly higher in participants with an anxiety disorder than in participants who did not meet diagnostic criteria for an anxiety disorder.

Study 1: CFA in an Undergraduate Sample

Method

Participants. A total of 744 (female *n* = 538 and male *n* = 206) undergraduate students were recruited from psychology courses at a large university in the Southeastern U.S. to participate in this study. Participants ranged in age from 18-55 years old (*M* = 20.52, *SD* = 4.06) and were predominately Caucasian (*n* = 393) or African-American (*n* = 327). The anxiety disorders module of the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* Axis I Disorders, (SCID-I; First, Spitzer, Gibbon, & Williams, 1997) administered to 707 of the participants (the remaining 37 participants were not interviewed), revealed the following rates of anxiety disorder diagnoses: panic disorder (3.0%), agoraphobia (1.6%), SAD (4.5%), specific phobia (12.4%), obsessive-compulsive disorder (OCD; 2.5%), posttraumatic stress disorder (PTSD; 5.2%), and GAD (3.8%). Base rates of individuals meeting criteria for an anxiety disorder diagnosis were found to be consistent with those in the general population (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000). No inclusion/exclusion criteria were implemented for this study. All participants received course credit in exchange for their participation in the study. The study was deemed exempt from review by the Institutional Review Board at Appalachian State University (see Appendix C).

Measures. The Demographic Questionnaire consisted of questions assessing various demographic characteristics (i.e., age, sex, ethnicity/race, education level). In addition to demographic features, participants answered questions related to frequency of alcohol consumption (i.e., number of days alcohol is consumed per week) and frequency of caffeine consumption (i.e., number of caffeinated beverages consumed per day).

The ASI-3 is an 18-item measure of the higher order anxiety sensitivity factor and three lower order factors: Physical, Cognitive, and Social Concerns. Consistent with the ASI and ASI-R, ASI-3 items are rated on a 5-point Likert scale (0 = *very little* to 4 = *very much*). In the present investigation, ASI-3 items were found to have good internal consistency (Cronbach's alpha = .88). Consistent with Taylor et al., (2007), Cronbach's alpha values for the three subscales ranged from acceptable to good (Physical = .81, Cognitive = .91, Social = .79). Previous research has demonstrated that the ASI-3 possesses good criterion, convergent, and discriminant validity (Taylor et al., 2007). Consistent with previous research (Taylor et al., 2007), ASI-3 items for Study 1 were extracted from completed ASI-R protocols.

The Body Sensations Questionnaire (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984) is a 17-item self-report measure designed to specifically assess the degree of fears of anxiety-related somatic sensations. Participants were instructed to rate each item on a 5-point scale, ranging from 1 = *not frightened or worried by this sensation* to 5 = *extremely frightened by this sensation*. In the current study, the BSQ was found to possess good internal consistency (Cronbach's alpha = .90). The BSQ has also been shown to have moderate-to-good test–retest reliability, has been found to account for variance not accounted for by other anxiety measures (i.e., Agoraphobic Cognitions Questionnaire [ACQ]), and has been shown to discriminate individuals with anxiety disorders (Chambless et al., 1984).

The ACQ (Chambless et al., 1984) measures the frequency of certain thoughts that individuals experience in conditions that are anxiety provoking. The ACQ consists of 14 items that are rated on a 5-point Likert-type scale ranging from 1 = *thought never occurs* to 5 = *thought always occurs*. The ACQ has been shown, in the present study, to possess a relatively high internal consistency of .81. Research indicates that the BSQ and ACQ provide

unique information in that they are only moderately correlated (*r* scores between .36 and .67) with each other (Chambless et al., 1984).

The SCID-I (First et al., 1997) is a semi-structured interview designed to assist trained raters in making reliable Axis I diagnoses. Only the anxiety disorders module was administered in the current study. This module includes questions that aid in the diagnosis of the majority of the anxiety disorders including panic disorder, agoraphobia, specific phobia, PTSD, OCD, and GAD. Clinical psychology doctoral students received extensive training in and served as the raters who administered the SCID-I module.

Procedures. When participants arrived at the research laboratory, they were met by one of three clinical psychology doctoral students and asked to read and sign a copy of the informed consent document. Participants were informed that the study was intended to obtain a better understanding of anxiety and would consist of two parts: a series of questionnaires and a brief clinical interview. The first part of the experiment consisted of having participants complete a series of self-report questionnaires (i.e., a demographic questionnaire, the ASI-R, BSQ, and ACQ), the order of which was randomized. Completion of the questionnaires took participants approximately 10-20 minutes. A doctoral-level graduate student who had received advanced training in the administration of the SCID-I and who was blind to scores on the anxiety sensitivity measures administered the anxiety disorders module of the SCID-I. The interview was completed in a private room adjoining the research space. The order of completion for the questionnaires and interview was counterbalanced across participants. To ensure diagnostic accuracy and to protect against rater drift, the interviewers participated in two additional interview training sessions during the study. The time spent administering the SCID-I anxiety disorders module ranged from approximately 5-45 minutes, depending on

participant responses to the SCID-I items. In general, the more anxiety symptoms the participant endorsed, the longer the interview took to complete. Upon completion of the interview, participants were asked to finish the self-report questionnaires if necessary. Any participant that met criteria for a *DSM-IV-TR* (2000) anxiety disorder diagnosis was provided with a list of appropriate mental health referral sources.

Results

Model fit. CFAs were conducted using LISREL version 8.8 (Joreskog & Sorbom, 2006). Typically, chi-square statistics are used as an indicator of differences in fit between the hypothesized model and the data, with non-significant *p*-values indicating a good fit. However, the chi-square goodness-of-fit tests often produce significant chi-square values due to the detection of trivial differences in large sample sizes, so additional fit indices were also inspected (Brown, 2006; Byrne, 2001; Diamantopoulos, & Siguaw, 2000). Based on the recommendations of Hu and Bentler (1998, 1999), model fit for both samples was evaluated using a combination of fit indices using empirically derived cutoff scores. Specifically, good fit was indicated by RMSEA $\leq$ .06, SRMR $\leq$ .08, and CFI $\geq$ .95.

CFAs. In the undergraduate sample, the 18 ASI-3 items were extracted from completed ASI-R protocols. Prior to conducting the CFAs, the normality indicators were examined. Results indicated statistically significant skew, 60.25, $p < .001$, and kurtosis, 29.43, $p < .001$. The joint test of non-normality was also significant, $\chi^2 = 4495.49$, $p < .001$, providing sufficient evidence that the assumption of a multivariate-normality was violated. Thus, the asymptotic covariance matrix with the weighted-least squares (WLS) was used in the CFA due to the extent of the non-normality of the data.

First, the hierarchical model, hypothesized to provide the best fit to the data, was evaluated (see Figure 1). The Physical, Cognitive, and Social Concerns first-order factors were each measured by 6-items, with these first-order factors all loading onto one higher-order factor (anxiety sensitivity). While chi-square analyses indicated a poor model fit, χ^2 (132) = 474.57, $p < .01$, all three relative fit indices indicated the hierarchical model provided a good fit to the data, RMSEA = .06, SRMR = .05, CFI = .97 (see Table 1).

The three-factor model, based on the structure reported by Taylor et al. (2007), was then tested. As stated previously, the three-factor model was comprised of the ASI-3 items loading onto three first-order anxiety sensitivity factors (i.e., Physical, Cognitive, and Social Concerns) with no common second-order factor of generalized anxiety sensitivity (see Figure 2). Results indicated this model provided a poor fit to the data, as the CFI was the only fit index to indicate good model fit, χ^2 (135) = 792.26, $p < .001$; RMSEA = .08, SRMR = .21, CFI = .95. A change in chi-square test was conducted to compare the three-factor model and the hierarchical model. Results revealed the hierarchical model provided improved fit over the three-factor model, $\Delta\chi^2(3) = 317.69$, $p < .001$. Further, the 90% confidence intervals for the RMSEA also indicated that the hierarchical model had a significantly better fit than the three-factor model as evidenced by a lower RMSEA value with non-overlapping confidence intervals. These results, coupled with a higher SRMR index, indicated that while the three-factor model provided poor fit to the data, the hierarchical model provided a significantly better fit to the data.

Next, the one-factor model, or the original conceptual model of anxiety sensitivity that consisted of the 18 ASI-3 items all loading onto a single factor (anxiety sensitivity), was evaluated (see Figure 3). Results indicated that the one-factor model provided a poor fit to

the data, $\chi^2(135) = 2139.06$, $p < .001$; RMSEA = .14, SRMR = .11, CFI = .85, with no fit indices indicating good model fit. Additionally, the difference in chi-square test comparing the hierarchical model and the one-factor model, $\Delta\chi^2(3) = 1664.49$, $p < .001$, indicated the hierarchical model provided significantly better fit to the data compared with the one-factor model. Examining the RMSEA values of both models also led to the same conclusion, with the hierarchical model demonstrating significantly lower RMSEA values than the one-factor model and provided additional evidence that the hierarchical model possessed significantly better fit to the data than the one-factor model.

Validity analyses. Following CFAs, internal consistency and convergent and discriminant validity of the ASI-3 were assessed. In the current study, the ASI-3 items were found to have good internal consistency (Cronbach's alpha = .89; Nunnally & Bernstein, 1994). Consistent with Taylor et al., (2007), coefficient alpha values for the three subscales were acceptable to good (Physical Concerns = .81, Cognitive Concerns = .91, Social Concerns = .79).

To assess convergent validity, correlations between the ASI-3 scores and measures of related constructs, the BSQ and the ACQ scores, were evaluated (see Table 2). Results indicated statistically significant, positive correlations between the ASI-3 and the BSQ scores and between the ASI-3 and the ACQ scores, with high levels of agoraphobic cognitions and fear of body sensations associated with high levels of anxiety sensitivity. These findings support the convergent validity of the ASI-3.

To further test for convergent validity, the correlations between the ASI-3 scores and each of the anxiety disorder diagnoses and the ASI-3 scores and whether a person was diagnosed with an anxiety disorder were evaluated. Results showed a statistically significant,

small, positive correlation between the ASI-3 scores and anxiety disorder diagnoses. Analyses also produced statistically significant, but small correlations between the ASI-3 scores and the anxiety disorder diagnoses of panic disorder, agoraphobia, SAD, PTSD, GAD, specific phobia, and OCD. These findings indicate that higher levels of anxiety sensitivity are associated with meeting the criteria for an anxiety disorder diagnosis, further supporting the convergent validity of the ASI-3 instrument.

Discriminant validity was assessed by examining the correlations between the ASI-3 scores with the theoretically unrelated constructs of alcohol and caffeine consumption. Previous research has demonstrated that alcohol and caffeine use were not related to anxiety sensitivity, and in some studies if results suggested a relationship did exist, the association was partially explained by a third variable, such as motives for consuming alcohol and caffeine (McWilliams, & Asmundson, 2001; Novak et al., 2003; Zack et al., 2006). Results indicated that the relationships between the ASI-3 scores and caffeine consumption and the ASI-3 scores and alcohol consumption were negligible (see Table 2). These results support the lack of a relationship between anxiety sensitivity, as assessed by the ASI-3, and self-reported measures of unrelated constructs, such as alcohol and caffeine consumption. Overall, the ASI-3 appears to be a valid measure of anxiety sensitivity and possesses good internal consistency, convergent, and discriminant validity.

Study 2: Extension in a Community Sample

Method

Participants. A large, community sample of 1,002 (65% female and 35% male) residents from a university town in rural North Carolina were recruited by mass advertising to participate in a randomized, placebo-controlled trial of a nutritional supplement.

Participants ranged in age from 18 to 85 years old (*M* = 45.96; *SD* = 16.27) and were stratified by age during recruitment to ensure representation from various age ranges: 40% were young adults (18 - 40 years old), 40% were middle aged adults (41 - 65 years old), and 20% were older adults (66 - 85 years old). Participants were also stratified by Body Mass Index (BMI) to include: 33% normal weight (BMI 18.5 - 24.9), 33% overweight (BMI 25 - 29.9), and 33% obese (BMI of 30 or more). The majority of participants had completed a high school education (97.7%) and approximately half had earned a college degree (56%). Racial and ethnic backgrounds included: 95% Caucasian, 1.8% African-American, and 3.2% other.

Measures. The ASI-3, as described in Study 1, measures one higher order anxiety sensitivity construct and three lower order factors: Physical, Cognitive, and Social Concerns via 18 items. In the current investigation, the ASI-3 items were found to have good internal consistency (Cronbach's alpha = .90). In addition, Cronbach's alpha values for the three subscales were in the good range (Physical Concerns = .84, Cognitive Concerns = .88, Social Concerns = .80).

Procedures. Data were collected for this research as part of a larger study examining the effects of a nutritional supplement on physiological and psychological health. Participants received $300 in exchange for completing the entire 12-week supplementation protocol. Two weeks prior to their first lab visit, participants were asked to complete a series of online demographic and psychological questionnaires, in which the ASI-3 was embedded. Participants who did not have computer access completed the questionnaires via a lab computer on the day they arrived for their first lab session.

Results

Model fit. As in Study 1, CFAs were conducted using LISREL version 8.8 (Joreskog & Sorbom, 2006). Model fit was determined based on examination of chi-square and three relative fit indices (SRMR ≤ .08, CFI ≥ .95, RMSEA ≤ .06; Brown, 2006; Byrne, 2001; Diamantopoulos & Siguaw, 2000).

CFAs. In the community sample, CFAs were conducted on the 18 ASI-3 items administered as a standalone measure. Similar to Study 1, normality indicators were evaluated before CFAs were performed. Results indicated the presence of significant standardized skew (93.24, $p < .001$) and kurtosis (42.57, $p < .001$). In addition, the assumption of multivariate normality was violated as evidenced by a significant joint test of non-normality, $\chi^2 = 10506.33$, $p < .001$. Accordingly, the asymptotic covariance matrix with the WLS was also utilized in the following CFAs.

The hierarchical model, the proposed best fitting model, was tested first (see Figure 1). Consistent with the hypotheses, the findings revealed that the hierarchical model provided a good fit to the data as evidenced by all examined fit indices, with the exception of chi-square, meeting the criteria for good fit, $\chi^2 (132)= 464.06$, $p < .001$; RMSEA = .05, SRMR = .05, CFI = .98 (see Table 1).

To examine whether the hierarchical model provided the best fit to data collected from a community sample, the two alternative models described in Study 1 (the three-factor model, see Figure 2, and the one-factor model, see Figure 3), were also tested in Study 2. With only the CFI indicating good model fit, results suggested that the three-factor model provided a poor fit to the community sample data, $\chi^2 (135)= 994.6$, $p < .001$; RMSEA = .08, SRMR = .26, CFI = .96. A difference in chi-square test was conducted comparing the

hierarchical model and the three-factor model and revealed that the hierarchical model offered improved model fit over the three-factor model, $\Delta\chi^2(3) = 530.54$, $p < .001$. Additionally, the RMSEA values were examined and the 90% RMSEA confidence intervals were computed to further compare the models. Inspection of the confidence intervals for the RMSEA revealed a lack of overlap, and the RMSEA value was lower for the hierarchical model than for the three-factor model, indicating that the hierarchical model had a significantly better fit than the three-factor model.

Similar to Study 1, results indicated that the one-factor model provided poor fit to the data as only one fit index, the SRMR, met fit criteria, χ^2 (135) = 1950.38, $p < .001$; RMSEA = .12, SRMR = .08, CFI = .92. Results of a difference in chi-square test indicated that the hierarchical model provided improved model fit over the one-factor model, $\Delta\chi^2(3) = 1664.49$, $p < .01$. The RMSEA for the hierarchical model was lower than the RMSEA for the one-factor model with no overlap in confidence intervals. Thus, the hierarchical model of the ASI-3 demonstrated significantly better fit to the data than the three-factor and one-factor models.

Multi-Group Comparison

The third phase of this investigation was to test for equivalence of the ASI-3 items and the underlying latent structure across undergraduates and community residents. A factorial analysis was conducted on the hierarchical model due to the support that the model provided the best fit to the data in both Study 1 and Study 2. For comparison purposes, CFAs were conducted where the data were analyzed together in order to estimate parameters for both groups simultaneously and to provide fit statistics. Fit statistics for all invariance models are presented in Table 3. As summarized by Byrne (2001), the multi-group analysis

procedure involved consecutive and increasingly restrictive tests of invariance conducted on the number of factors (configural invariance), first- and second-order factor loadings (weak invariance 1 and 2), and means of first and second-order factors (strong invariance 1 and 2). As each new set of parameters was evaluated, those known to be group invariant were constrained to equal.

First, the hierarchical model was tested across the undergraduate and community samples for configural invariance, meaning the number of factors and pattern of indicator-factor loadings was identical across groups. Results revealed that in both samples the overall hierarchical factor structure fit the data, RMSEA = .03, SRMR = .06, CFI = 1.00, providing strong evidence for an equal number of factors for undergraduate students and community residents.

Next, weak invariance, or equal factor structures and factor loadings, was evaluated. Due to the hierarchical nature of the model, evaluation of weak invariance was split into two stages. The first stage constrained only the second-order factor loadings to equal (weak invariance 1), and the second stage constrained both the first- and second-order factor loadings to equal (weak invariance 2). Findings of the test of weak invariance 1 suggested acceptable fit to the data as evidenced by the RMSEA (.04) and CFI (1.00) values meeting fit criteria with only the SRMR (.09) not indicating good fit. Results of the evaluation of weak invariance 2 also indicated acceptable fit to the data, as the CFI index and the SRMR continued to indicate good model fit (RMSEA = .08, SRMR = .08, CFI = 1.00). In addition to having the same number of factors, findings demonstrated that the first- and second-order factor loadings of the ASI-3 were partially invariant for undergraduate students and community residents, as evidenced by two fit indices (CFI, SRMR) yielding good fit.

Strong invariance was then evaluated, constraining the factor structures, first- and second-order factor loadings, and means of factors to equal. Again, because the model is hierarchical, the testing of strong invariance was separated into strong invariance 1, where means of second-order factors were constrained to equal, and strong invariance 2, where means of both first- and second-order factors were constrained to equal. Analyses of strong invariance 1 supported poor model fit as evidenced by only the CFI index value meeting fit criteria, RMSEA = .30 , SRMR = .72, CFI= .95. Strong invariance 2 analyses did not converge (did not run), likely due to the fact that because the second-order factor means were set to equal, then, in turn, the first-order factor means must be equal. Thus, the findings indicate that among undergraduate and community residents the means of factors are unequal.

Together, the results of the multi-group CFAs testing the hierarchical model of the ASI-3, when administered to undergraduate and community residents, showed equivalence across factor structures and some equivalence across first- and second-order factor loadings.

Discussion

Previous research indicates that anxiety sensitivity scores predict the occurrence of anxiety disorder diagnoses and other Axis I disorders (Schmidt et al., 2006), with specific anxiety sensitivity domains being associated with, and predictive of, particular forms of anxiety and mood pathology (Peterson & Plehn, 1999). In an effort to improve anxiety sensitivity measurement, with particular emphasis on reliable assessment of the most replicated dimensions of anxiety sensitivity, the ASI-3 was developed. However, to date, limited research has been conducted evaluating the psychometrics and factor structure of the newly developed ASI-3. The present study was designed to extend previous research by

testing several competing factor models (hierarchical, three-factor, and one-factor models) using ASI-3 data collected from a large sample of undergraduate students and a large sample of community residents.

The results of Study 1 indicated that the hierarchical model provided a good fit for ASI-3 data in the undergraduate sample, as evidenced by all relative fit indices meeting fit criteria, when ASI-3 items were extracted from completed ASI-R protocols. Inconsistent with Taylor et al. (2007), the three-factor model yielded mediocre fit, with only one relative fit index yielding good fit to ASI-3 data collected from the undergraduate sample and findings that were not identical to fit statistics yielded from the hierarchical model. Although the one-factor model represents one way to measure anxiety sensitivity (i.e., overall anxiety sensitivity score), previous research findings and results of this study indicated poor model fit (Taylor et al., 2007). Thus, in undergraduate students, the ASI-3 is suggested to measure a latent structure of anxiety sensitivity that is comprised of three sub-domains: Physical, Cognitive, and Social Concerns, all subsumed under an overall anxiety sensitivity construct.

To date, studies have yet to investigate the previously established models of anxiety sensitivity, as assessed by the ASI-3, in community residents. Thus, Study 2 was designed to extend previous research by examining the fit of three competing factor structures using data from a large community sample that completed ASI-3 items as a stand-alone measure. As hypothesized, results of the CFA indicated that the hierarchical model provided optimal fit, with the three-factor and one-factor models yielding poor fit to the ASI-3 data. Thus, findings from Study 1 and Study 2 are consistent with previous research investigating the factor structure of the original ASI and the ASI-R in that the best fitting model was repeatedly found to be hierarchical in nature (Arnau et al., 2009; Deacon et al., 2003; Taylor & Cox,

1998; Zinbarg et al., 1997). In addition, it should be noted that the three lower order components identified in the present research replicated the intended factor structure of the ASI-3 (Physical, Cognitive, and Social Concerns), which was based on the most replicated structure observed in factor analytic studies of the original ASI (Zinbarg et al., 1997).

Previous research by Taylor and colleagues (2007) examined group invariance of the ASI-3 by conducting multi-group analyses comparing men and women (American and Canadian residents) and several samples that were not split by gender (e.g., residents of the United States, Canada, France, Mexico, the Netherlands, Spain, and a clinical sample of American and Canadian residents). Findings, when evaluating the three-factor model, showed the same number of factors across groups, indicating measurement equivalence for the three-factor solution. The current investigation extended previous research by conducting multi-group analyses utilizing the hierarchical model, based on the favorable results demonstrated when analyzing the model separately, in undergraduates and community residents. Multi-group CFA results were generated not only to determine whether the factor structure was equivalent, but also to examine successive levels of measurement equivalence of the hierarchical model of the ASI-3 among undergraduates and community residents. Findings demonstrated weak invariance. That is, the factor structure and first- and second-order factor loadings were shown to be adequately equivalent across the two samples. Findings from the present investigation, coupled with results from previous research, support measurement equivalence of the ASI-3 across samples, though it is important to note that analyses across studies were conducted using different models of anxiety sensitivity. Thus, additional research examining the factor structure of the ASI-3 and measurement equivalence across groups is needed.

Another aim of this study was to further evaluate the psychometric properties of the ASI-3 through examination of internal consistency as well as convergent and discriminant validity. The ASI-3 items were found to have good overall internal consistency in both Study 1 (Cronbach's alpha = .88) and Study 2 (Cronbach's alpha = .90). Additionally, consistent with Taylor et al. (2007), subscale coefficient alpha values in Study 1 were good for Physical (Cronbach's alpha = .81) and Cognitive Concerns (Cronbach's alpha = .91) and acceptable for Social Concerns (α = .79). Cronbach's alpha values for the three subscales in Study 2 were all in the good range (Physical = .84, Cognitive = .88, Social = .80), indicating consistency with Study 1 and Taylor et al. (2007). These results indicate that the ASI-3 is a good measure of the overall anxiety sensitivity construct and each of the subdomains: Physical, Cognitive, and Social Concerns.

Convergent validity analyses revealed a strong relationship between anxiety sensitivity, as measured by the ASI-3, and theoretically related constructs of fear of bodily sensations (BSQ scores) and frequency of agoraphobic cognitions (ACQ scores). These results were consistent with prior research examining the relationships between anxiety sensitivity scores, as measured by the ASI-R and the ASI, and scores on the ACQ and the BSQ (Asmundson, Norton, Lanthier, & Cox, 1996; Deacon et al., 2003). Additionally, although small, findings of the present study indicated statistically significant relationships between anxiety sensitivity and anxiety disorder diagnoses. Specifically, participants that met *DSM-IV-TR* (2000) criteria for an anxiety disorder based on clinician ratings on the SCID averaged significantly higher scores on the ASI-3 than participants who did not meet criteria for an anxiety disorder. In addition, among the anxiety disorders, individuals that met *DSM-IV-TR* (2000) criteria for panic disorder scored higher on the ASI-3 than those that met the

criteria for any other disorder, and ASI-3 scores in individuals with SAD were the second highest. These findings suggest that the ASI-3 scores may be more predictive of certain anxiety disorders than others. Thus, group differences are indicated between those with disordered anxiety and those without and provided further support for the convergent validity of the ASI-3 instrument.

Previous research has suggested that anxiety sensitivity is not related to alcohol or caffeine consumption (e.g., McWilliams & Asmundson, 2001; O'Connor, Farrow, & Colder, 2008). Thus, as a measure of discriminant validity, the ASI-3 was correlated with participants' self-reported use of alcohol and caffeine. Consistent with previous research (Novak et al., 2003; Zack et al., 2006), analyses revealed a nonsignificant relationship between ASI-3 scores and whether one consumes alcohol. Similarly, analyses revealed the lack of a statistically significant relationship between anxiety sensitivity and caffeine consumption. Thus, overall, the ASI-3 appears to be a valid measure of anxiety sensitivity and possesses good internal consistency and convergent and discriminant validity.

Although the present investigation possessed several important strengths including two different samples, inclusion of individuals with anxiety diagnoses, and robust statistical power, the results should be interpreted in the context of the study's limitations. First, Study 1 data analyses were conducted on ASI-3 items that had been extracted from completed ASI-R protocols. Although this replicated the methodology applied by Taylor and colleagues (2007) in their development of the ASI-3, the generalizability of these findings to undergraduate samples that have completed the ASI-3 as a standalone measure remains uncertain. Additionally, although the sample utilized in Study 1 contained a known number of individuals who met full criteria for one or more anxiety diagnoses, data from an

exclusively clinical sample was not collected. Thus, study results may not be generalizable to clinical samples or clinical settings. Notably, previous work by Taylor et al. (2007) found that the three-factor model did not provide a good fit to data derived from a clinical sample, implying potential group differences in clinical patients. Therefore, the latent structure of the ASI-3 when administered to an exclusively clinical sample awaits empirical scrutiny. Similarly, the sample utilized in Study 2 was comprised of rural community residents, potentially limiting the generalizability of findings to community residents across the U.S. Notably, however, the range in participant age was large and participants were stratified by age to ensure representation from various age groups. In addition, the sample was particularly well educated; with 97.7% having completed a high school education and 56.6% having earned a college degree.

Researchers have yet to evaluate the test-retest reliability of the ASI-3. Because anxiety sensitivity is considered a reasonably stable individual difference variable, as measured by the ASI, future studies are needed to determine the stability of ASI-3 scores over time (Ehlers, 1995; Reiss, 1991; Schmidt et al., 1997, 1999). In addition, as a risk factor for anxiety disorders and other psychopathology (Schmidt et al., 2006), the predictive nature of the ASI-3 requires further study. To this end, prospective studies where data are collected longitudinally, rather than cross-sectionally, are required to investigate whether the ASI-3 predicts risk of psychopathology and to elucidate differences in prediction among the subscales. Additionally, further investigation of the racial similarities and differences of anxiety sensitivity, as measured by the ASI-3, are needed. In summary, continued evaluation of the factor structure and psychometric properties of the ASI-3 will serve to ensure that the

factor structure is replicable across various samples and to validate that the ASI-3 provides a statistically sound measurement of anxiety sensitivity.

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Table 1

Fit Indices for the Three-Factor Model, One-Factor Model, and Hierarchical Model of the ASI–3 for Study 1 and Study 2

	Model		
	Hierarchical	3-Factor	1- Factor
Undergraduate Sample (n = 744)			
$\chi^2(df)$	474.57 (132)*	792.26 (135)**	2139.06 (135)**
RMSEA (90% CIs)	.06 (.053-.065)	.08 (.076-.086)	.14 (.14-.15)
SRMR	.05	.21	.11
CFI	.97	.95	.85
Community Sample (n = 1002)			
$\chi^2(df)$	464.06 (132)**	994.6 (135)**	1950.38 (135)**
RMSEA (90% CIs)	.05 (.045-.055)	.08 (.075-.084)	.12 (.11-.12)
SRMR	.05	.26	.08
CFI	.98	.96	.92

Note. ASI-3 = anxiety sensitivity index-3 (Taylor et al., 2007); RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR = standardized root-mean-square residual; CFI = comparative fit index.

*p < .01, **p < .001; Criteria for good fit = SRMR ≤ .08, CFI ≥ .95, RMSEA ≤ .06 (Hu & Bentler, 1999).

Table 2.

Correlations for Validity Analyses

	ASI3	BSQ	ACQ	Alcohol	Caffeine	Anx Dx	PD	AG	SAD	SP	PTSD	GAD	OCD
ASI3	-												
BSQ	.64**	-											
ACQ	.63**	.58**	-										
Alcohol	.02	-.02	.02	-									
Caffeine	.02	-.01	.07	.09**	-								
Anx Dx	.26**	.20**	.27**	.01	.06	-							
PD	.24**	.14**	.20**	.06	.00	.32**	-						
AG	.16**	.11**	.17**	.01	-.03	.23**	.32**	-					
SAD	.20**	.17**	.23**	-.03	.02	.40**	.12**	.30**	-				
SP	.15**	.14**	.15**	-.02	-.01	.68**	.09*	.09*	.10**	-			
PTSD	.09*	.08*	.12**	.04	.08*	.43**	.03	.02	.04	.05	-		
GAD	.16**	.12**	.14**	.00	.00	.36**	.23**	.15**	.21**	.06	.22**	-	
OCD	.11**	.13**	.12**	-.02	.02	.28**	.19**	.34**	.21**	.14**	.13**	.20**	-

Note. ASI-3 = Anxiety Sensitivity Index-3 (Taylor et al., 2007); BSQ = Body Sensations Questionnaire (Chambless et al., 1984); ACQ = Agoraphobic Cognitions (Chambless et al., 1984); Anx Dx = any anxiety diagnosis; PD = panic disorder; AG = agoraphobia; SAD = social anxiety disorder; SP = specific phobia; PTSD = posttraumatic stress disorder; GAD = generalized anxiety disorder; OCD = obsessive-compulsive disorder.

** = $p < .01$; * = $p < .001$

Table 3

Fit Indices for the Multi-group Comparison of the Hierarchical Model of the ASI–3

Model	$\chi^2(df)$	RMSEA (90% CIs)	SRMR	CFI
Configural Invariance	512.95 (264)*	.03(.029-.037)	.06	1.00
Weak Invariance 1	593.42 (267)*	.04 (.033-.041)	.09	1.00
Weak Invariance 2	1820.24 (282)*	.08 (.075-.082)	.08	1.00
Strong Invariance 1	24700.00 (317)*	.30 (.29-.30)	.72	.95
Strong Invariance 2	-	-	-	-

Note. RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR = standardized root-mean-square residual; CFI = comparative fit index; Configural Invariance = number of factors and pattern of indicator-factor loadings constrained to equal; Weak Invariance 1 = second-order factor loadings constrained to equal; Weak Invariance 2 = first- and second-order factor loadings constrained to equal; Strong Invariance 1 = second-order means of factors constrained to equal; Strong Invariance 2 = first- and second order means of factors constrained to equal; - = did not converge.

*$p < .01$; Criteria for good fit = SRMR $\leq$ .08, CFI $\geq$ .95, RMSEA $\leq$ .06 (Hu & Bentler , 1999).

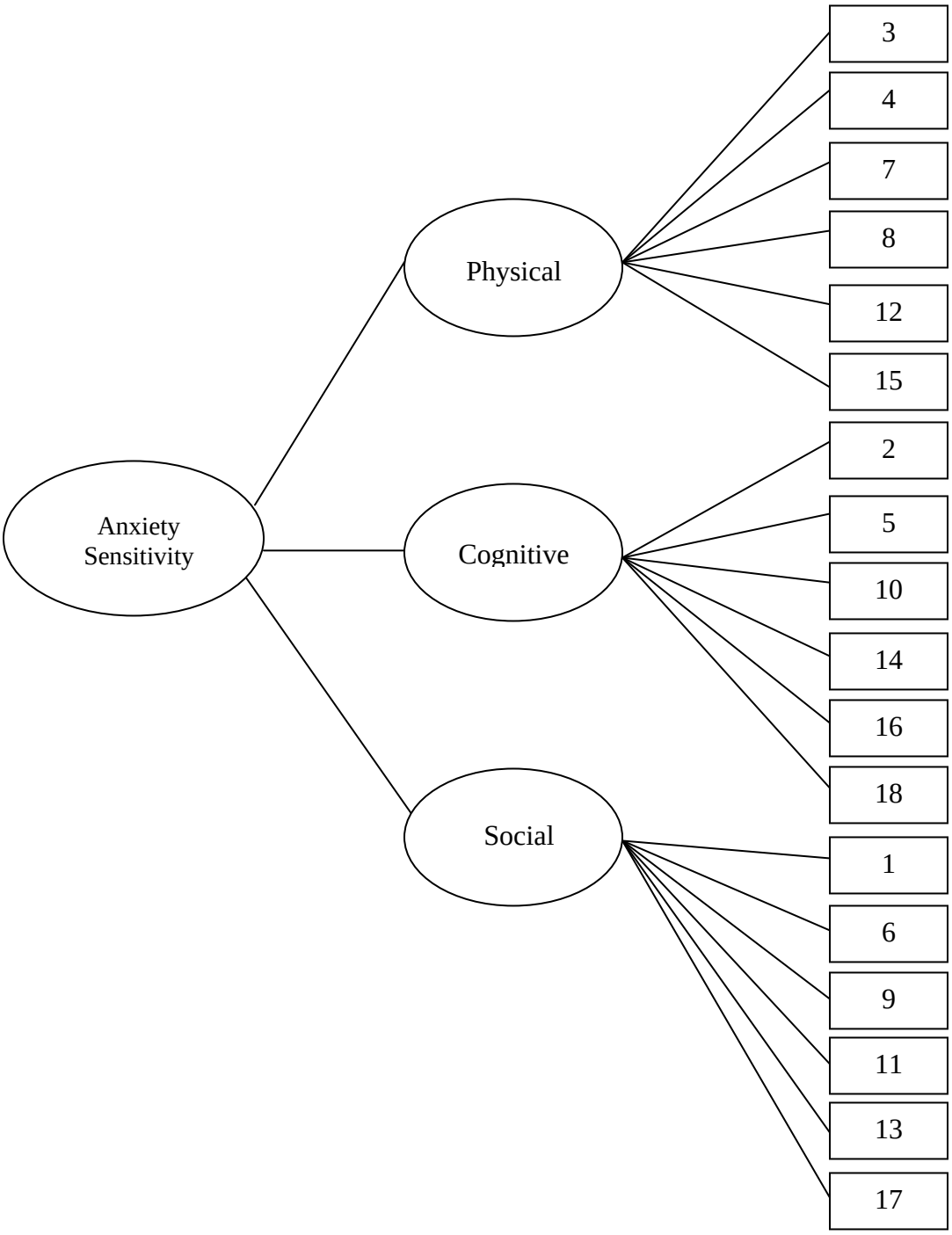

Figure 1. Hierarchical model tested. The hierarchical model consists of Anxiety Sensitivity Index-3 items (item numbers depicted in rectangles) loading onto three second-order factors: Physical, Cognitive, and Social Concerns (depicted in ovals in the center), and these second-order factors all load onto the higher-order factor overall anxiety sensitivity (depicted in left oval).

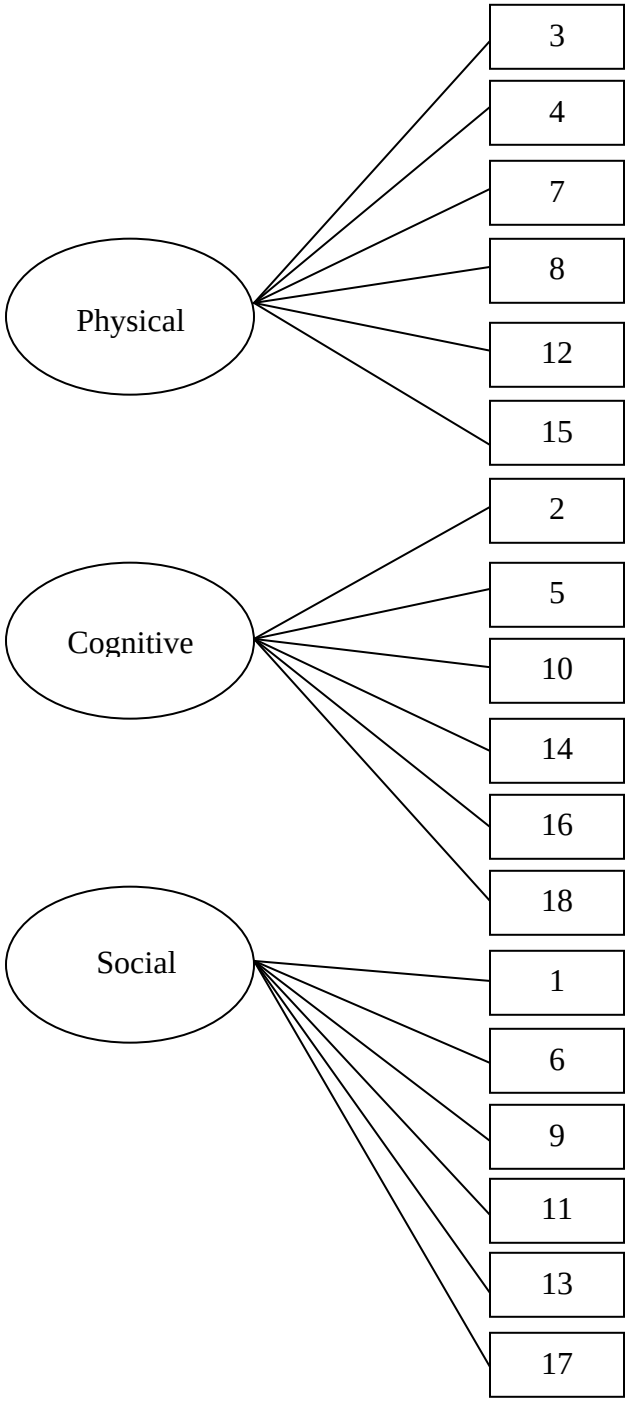

Figure 2. Three-factor model tested. The three-factor model consists of Anxiety Sensitivity Index-3 items (item numbers depicted in rectangles) loading onto the three second-order factors: Physical, Cognitive, and Social Concerns (depicted in ovals in the center).

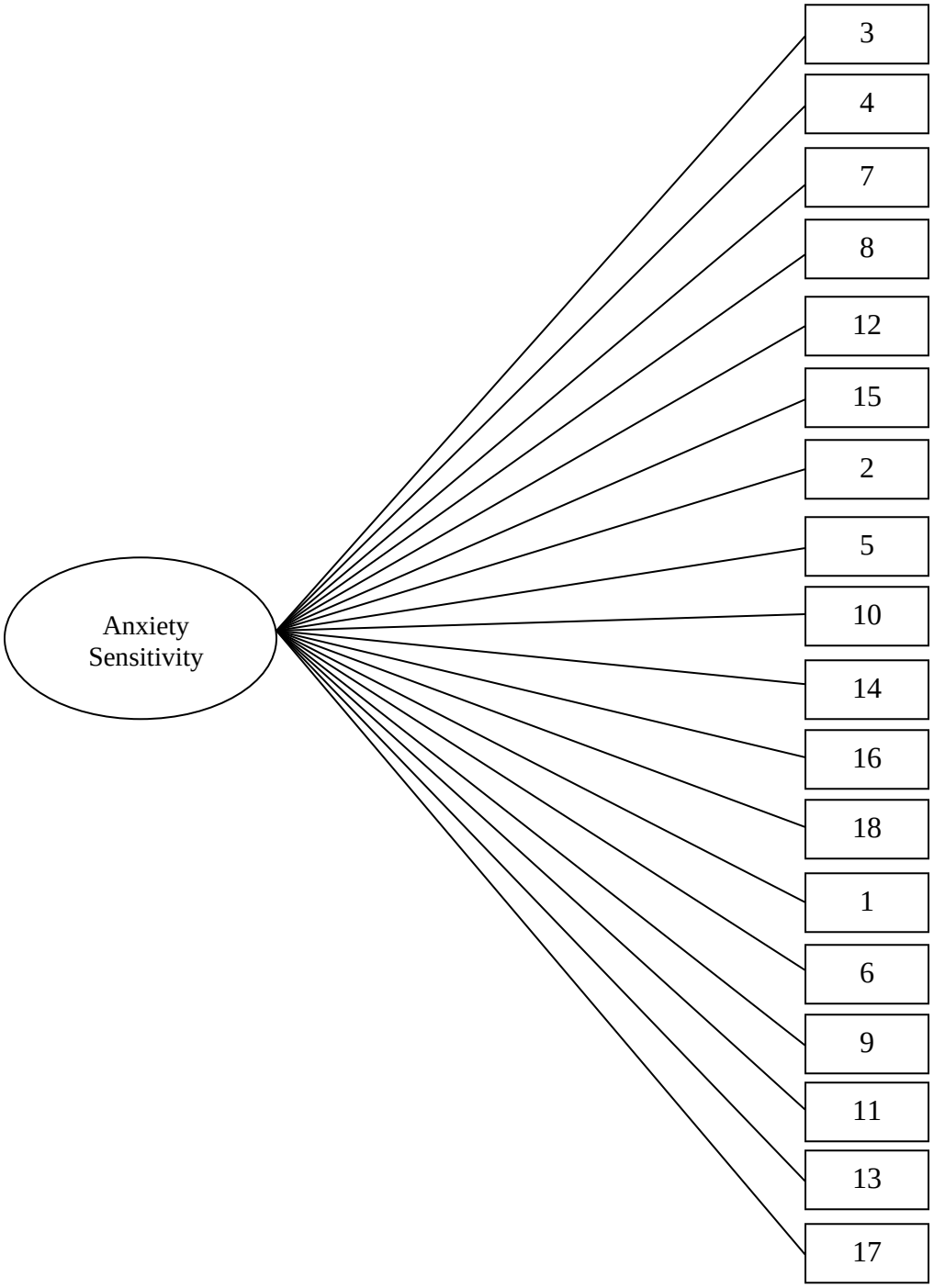

Figure 3. One-Factor model tested. The three-factor model consists of Anxiety Sensitivity Index-3 items (item numbers depicted in rectangles) loading onto the higher-order factor overall anxiety sensitivity (depicted in left oval).

Appendix A

ASI-R

Use the scale below to determine the *one* phrase that best represents the extent to which you agree with each item. If any of the items concern something that is not part of your experience (e.g., "It scares me when I feel shaky" for someone who has never trembled or had the "shakes"), answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience.

0 = Very Little	1 = A Little	2 = Some	3 = Much	4 = Very Much

_____1. It is important to me not to appear nervous.
_____2. When I cannot keep my mind on a task, I worry that I might be going crazy.
_____3. It scares me when I feel "shaky" (trembling).
_____4. It scares me when I feel faint.
_____5. It scares me when my heart beats rapidly.
_____6. It scares me when I am nauseous.
_____7. When I notice my heart is beating rapidly, I worry that I might have a heart attack.
_____8. It scares me when I become short of breath.
_____9. When my stomach is upset, I worry that I might be seriously ill.
____10.It scares me when I am unable to keep my mind on a task.
____11.When my head is pounding, I worry that I could have a stroke.
____12.When I tremble in the presence of others, I fear what people might think of me.
____13.When I feel like I'm not getting enough air, I get scared that I might suffocate.
____14.When I get diarrhea, I worry that I might have something wrong with me.
____15.When my chest feels tight, I get scared that I won't be able to breathe properly.
____16.When my breathing becomes irregular, I fear that something bad will happen.
____17.It frightens me when my surroundings seem strange or unreal.
____18.Smothering sensations scare me.
____19.When I feel a pain in my chest, I worry that I'm going to have a heart attack.
____20.I believe it would be awful to vomit in public.
____21.It scares me when my body feels strange or different in some way.
____22.I worry that other people will notice my anxiety.
____23.When I feel "spacey" or spaced out, I worry that I might be mentally ill.
____24.It scares me when I blush in front of people.
____25.When I feel a strong pain in my stomach, I worry that it might be cancer.
____26.When I have trouble swallowing, I worry that I could choke.
____27.When I notice my heart skipping a beat, I worry there is something seriously wrong with me.
____28.It scares me when I feel tingling or prickling sensations in my hands.
____29.When I feel dizzy, I worry there is something wrong with my brain.
____30.When I begin to sweat in a social situation, I fear people will think negatively of me.
____31.When my thoughts seem to speed up, I worry that I might be going crazy.
____32.When my throat feels tight, I worry that I could choke to death.
____33.When my face feels numb, I worry that I might be having a stroke.
____34.When I have trouble thinking clearly, I worry there is something wrong with me.
____35.I think it would be horrible for me to faint in public.
____36.When my mind goes blank, I worry there is something terribly wrong with me

Appendix B

ASI-3

Please circle the number that best corresponds to how much you agree with each item. If any items concern something that you have never experienced (e.g., fainting in public) answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience. Be careful to circle only one number for each item and please answer all items.

	Very Little	**A little**	**Some**	**Much**	**Very much**
1. It is important for me not to appear nervous.	0	1	2	3	4
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3. It scares me when my heart beats rapidly.	0	1	2	3	4
4. When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
5. It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
6. When I tremble in the presence of others, I fear what people might think of me.	0	1	2	3	4
7. When my chest feels tight, I get scared that I won't be able to breathe properly.	0	1	2	3	4
8. When I feel pain in my chest, I worry that I am going to have a heart attack.	0	1	2	3	4
9. I worry that other people will notice my anxiety.	0	1	2	3	4
10. When I feel "spacey" or spaced out I worry that I may be mentally ill.	0	1	2	3	4
11. It scares me when I blush in front of people.	0	1	2	3	4
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.	0	1	2	3.	4
13. When I begin to sweat in a social situation, I fear people will think negatively of me.	0	1	2	3	4
14. When my thoughts seem to speed up, I worry that I might be going crazy.	0	1	2	3	4
15. When my throat feels tight, I worry that I could choke to death.	0	1	2	3	4
16. When I have trouble thinking clearly, I worry that there is something wrong with me.	0	1	2	3	4
17. I think it would be horrible for me to faint in public.	0	1	2	3	4
18. When my mind goes blank, I worry there is something terribly wrong with me.	0	1	2	3	4

Appendix C

IRB Exemption

To: Laci Zawilinski
Psychology
CAMPUS MAIL

From: _____
Julie Taubman, Institutional Review Board

Date: 2/06/2010

RE: Notice of IRB Exemption

Study #: 10-0166
Study Title: Confirmatory Factor Analysis of the Anxiety Sensitivity Index-3
Exemption Category: (4) Collection or Study of Existing Data, If Public or Unable to Identify Subjects

This submission has been reviewed by the IRB Office and was determined to be exempt from further review according to the regulatory category cited above under 45 CFR 46.101(b). Should you change any aspect of the proposal, you must contact the IRB before implementing the changes to make sure the exempt status continues to apply. Otherwise, you do not need to request an annual renewal of IRB approval. Please notify the IRB Office when you have completed the study.

Dear Laci,

Your study was reviewed by the IRB chair and exempted based on your statement that you have no identifiable information in your data set. Informed Consent would be waived. Please let us know if this changes.

CC:
Joshua Broman-Fulks, Psychology

Vita

Laci L. Zawilinski graduated from Florida State University (FSU) with a Bachelor of Science degree in Psychology in April of 2007. For the next two years, she worked as a full-time research assistant on a grant-funded treatment outcome investigation at the Anxiety and Behavioral Health Clinic at FSU. This experience sparked her interest in the study of anxiety, particularly with regard to risk factors for anxiety disorders, and plans for a career in psychological research. Further education soon became a necessary next step. Soon, Ms. Zawilinski was admitted to the Clinical Health Psychology Master of Arts Program at Appalachian State University (ASU) where she began work with her research mentor, Dr. Josh Broman-Fulks. She completed the graduate program in psychology at ASU and was awarded the M.A. degree in 2011. In August 2011, Ms. Zawilinski commenced work towards her Ph.D. in Clinical Psychology at the University of Southern Mississippi.

Ms. Zawilinski remained a student member of the Association for Behavioral and Cognitive Therapies and the American Psychological Association.