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Anxiety sensitivity and cross-cultural differences: An examination of the factor structure of the anxiety sensitivity [sic] index

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ANXIETY SENSITIVITY AND CROSS-CULTURAL DIFFERENCES:
AN EXAMINATION OF THE FACTOR STRUCTURE OF THE ANXIETY
SENSITIVITY INDEX

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Psychology:
General Experimental

by
KaMala Syretta Thomas
June 2001
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ABSTRACT

Research suggests that a hierarchical factor structure exists in the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986), with three or four lower order factors and a single higher order factor on which all items load. This hierarchical model has been found to generalize to both a clinical and a non-clinical population and to individuals of different age groups. However, only one study has examined whether it extends to individuals of diverse ethnic backgrounds. Carter et al. (1997) discovered that different factors of the ASI emerge for African-Americans than those reported by Zinbarg et al. (1997). Based on this, the current study examined the goodness of fit of the models proposed by Zinbarg et al. (1997) and Carter et al. (1999) in African-American, Latino, and Caucasian-American college students to determine which model would provide the best fit of the data collected from each ethnic group. The results of the analysis found no support for the model of the ASI that was reported by Zinbarg et al. (1997). However, the model reported by Carter et al. (1999) fit the data collected from each ethnic group. Within the limits of this study, no ethnic differences emerged in
the factor structure of the ASI. Instead, the results of this study suggest that a different factor structure of the ASI may exist between individuals in the general population and those with clinically diagnosable anxiety symptoms.
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CHAPTER ONE

INTRODUCTION

Anxiety disorders are among the most commonly reported psychological disorders in America (Karno, Golding, Burnam, Hough, Escobar, Wells, & Boyer, 1989). Lifetime prevalence rates of anxiety disorders range from 2% to 13% of the general population (American Psychiatric Association, 1994). Therefore, a great deal of research has been conducted to identify the factors that influence the development of anxiety. One factor that has received considerable attention for its role in the development of anxiety disorders is anxiety sensitivity (Asmundson, Gordon, & Norton, 1993; Cox, 1995; Cox, Endler, & Swinson, 1995; Donnel & McNally, 1990; Maller & Reiss, 1992; Reiss, Peterson, Gursky, & McNally, 1986; Taylor, 1996).

Anxiety sensitivity has been defined as a fear of anxiety symptoms based on the belief that these symptoms represent signs of danger (Reiss et al., 1986). Those who are high in anxiety sensitivity believe that anxious symptoms will inevitably result in negative consequences. They fear that anxiety symptoms will lead to physical
harm, embarrassment, and loss of control (Craske, 1999). Research suggests that this fear of anxiety is an important factor in the development of panic disorder (Taylor, 1996; Asmundson, Norton, Lanthier, & Cox, 1996; Maller & Reiss, 1992; Cox et al., 1995). For instance, Taylor (1996) postulated that when a person with high anxiety sensitivity experiences physical sensations they respond to these sensations with fear. This causes the feared sensations to intensify, which in turn causes the individual to become more afraid. The increase in fear causes an increase in the number and intensity of the feared sensations. According to Taylor (1996), this vicious cycle culminates into a panic attack.

It has been suggested that anxiety sensitivity is a cognitive predisposition in which individual differences exist (Cox, 1996; Donnell & McNally, 1990). Accordingly, those with high anxiety sensitivity may be at greater risk for developing panic disorder when they experience panic attacks because they are predisposed to misinterpret anxiety sensations catastrophically. In contrast, it is possible that low anxiety sensitivity is a protective factor against developing panic disorder (Donnell & McNally, 1990). To assess individual
differences in anxiety sensitivity, the Anxiety Sensitivity Index (ASI) was developed (Reiss et al., 1986). This measure has been consistently found to have sound psychometric properties and to be associated with the development of panic disorder, agoraphobia, and other anxiety disorders (Admundson et al., 1986; Cox et al., 1995; Maller & Reiss, 1992; Reiss et al., 1986).

In a study conducted by Maller and Reiss (1992) it was found that high scores on the ASI predict the development of subsequent panic attacks. To examine the relationship between anxiety sensitivity and panic attacks, these researchers conducted a longitudinal study in which they administered the ASI to 151 college students in 1984 and re-tested them in 1987. The participants were also interviewed regarding their history of experience with panic attacks and other anxiety disorders. It was found that ASI scores in 1984 predicted the number, frequency, and intensity of panic attacks in 1987. Further, participants with high anxiety sensitivity in 1984 were five times more likely to be diagnosed with an anxiety disorder in 1987 than participants with low ASI scores (Maller & Reiss, 1992). These findings support the view that individual
differences in anxiety sensitivity are predictive of the development of panic and other anxiety disorders.

Support for the finding that anxiety sensitivity is a predictor of panic status was found in a study conducted by Asmundson et al. (1996). This study was conducted to examine the effectiveness of commonly used measures of the fear of anxiety in individuals with and without panic attacks. A few of the measures included in this study were the ASI, the Agoraphobic Cognitions Questionnaire (ACQ; Chambless et al., 1984), and the Body Sensations Questionnaire (BSQ; Chambless et al., 1984). Compared to the other questionnaires examined in this study, the ASI was the best single predictor of panic status. These results are consistent with other studies asserting that anxiety sensitivity is a cognitive risk factor for panic disorder and agoraphobia (Craske, 1999; Cox, 1995; Cox, McNally, Horning, Hoffman, & Han, 1999; Parker, Swinson, 1996; McNally & Lorenzo, 1987; Maller & Reiss, 1992; Reiss et al., 1986; Watt, Stewart, & Cox, 1997).

Studies have been conducted to understand how anxiety sensitivity develops (Donnell & McNally, 1990; Cox et al., 1995; Reiss et al., 1986; Watt et al., 1998).
It was once believed that anxiety sensitivity develops as a result of previous experience with panic attacks (Goldstein & Chambless, 1978). Those individuals with a history of panic attacks were thought to have learned to anticipate and fear additional panic experiences. However, this view has been challenged by the finding that anxiety sensitivity can develop with no history of panic attacks (Donnell & McNally, 1990; Cox et al., 1995; Watt et al., 1998). According to Reiss et al. (1986), while a history of panic attacks may increase anxiety sensitivity by providing examples of frightening experiences, this history is not necessary for individuals to develop negative beliefs about the consequences of anxiety.

The results of a study conducted by Donnell and McNally (1990) lent support to the view that anxiety sensitivity can develop with no history of panic attacks. In this study, 425 college students were administered the ASI and the Panic Attack Questionnaire (PAQ; Norton, Dorward, and Cox, 1986). It was discovered that while participants who had high anxiety sensitivity were more likely to report both a personal and family history of panic than those with low anxiety sensitivity, two thirds
of those with high anxiety sensitivity had never experienced a panic attack. This suggests that a personal history of panic attacks is not necessary for the development of anxiety sensitivity (Donnell & McNally, 1990). There was support for this finding in a study conducted by Cox et al. (1995). To assess the relationship between anxiety sensitivity and panic attack symptomatology, these researchers factor analyzed the items on the ASI and the PAQ together using data collected from 209 outpatients who were diagnosed with panic disorder with and without agoraphobia. The results of the analysis indicated that general panic and anxiety sensitivity loaded as separate factors. This supported their hypothesis that anxiety sensitivity can exist independently of panic attacks (Cox et al., 1995).

Research has consistently found that a history of panic attacks is not a necessary condition for anxiety sensitivity to develop (Donnell & McNally, 1990; Cox et al., 1995; Reiss et al., 1986; Watt et al., 1998). In fact, in a study of the learning history origins of anxiety sensitivity, Watt et al. (1998) concluded that anxiety sensitivity appears to be related to learning experiences in childhood and adolescence. These learning
experiences were not found to be related to specific anxiety symptoms, but involved parental reinforcement of sick-role behavior related to somatic symptoms. In some cases, those individuals with high anxiety sensitivity grew up in the presence of a chronically ill family member, reported more medical visits, and were absent from school and work more often. Through vicarious learning, these people are taught to fear physical sensations similar to those found in panic and anxiety disorders, thus developing anxiety sensitivity (Watt et al., 1998).

Although anxiety sensitivity has been found to be related to several forms of clinical anxiety (Mailer & Reiss, 1992; Reiss et al., 1986), it is thought of as a cognitive risk factor for panic disorder (Cox, 1996). Therefore, the AST is a useful tool for determining whether an individual is at risk for developing panic disorder (Asmundson et al., 1996; Maller & Reiss, 1992). Recently, there has been a great deal of controversy over whether the AST measures a unidimensional or multidimensional construct (Cox, Parker, & Swinson, 1996; Reiss et al., 1986; Taylor, 1998; Zinbarg et al., 1997; Telch, Shermis, & Lucas, 1989). Initially, it was
believed that the ASI measures a unidimensional construct, which represents a general belief that anxiety experiences will lead to negative consequences (Reiss et al., 1986; Taylor, Koch, & Crockett, 1991). However, it has been suggested that using the ASI as a multidimensional assessment tool may prove to be useful for therapists because not all individuals with panic disorder fear the same consequences (Cox, 1996). Some individuals may endorse fears of the social consequences of panicking, while others may fear the physical symptoms experienced during a panic attack. Therefore, using subscale scores may have the potential to aid in clinical assessment (Zinbarg et al., 1997). It may enable therapists to tailor treatment to address the specific concerns of clients. Further, it is also possible that the ASI factors that are endorsed by an individual may change over time. Individuals may start out fearing the physical symptoms associated with panic attacks and end up fearing the social consequences of panicking (Cox, 1996). Due to the implications of determining whether the ASI measures a multidimensional construct, researchers have examined the factor structure of this measure (Cox, Parker, & Swinson, 1996; Lillienfeld,
Turner, and Jacob, 1993; Taylor, 1998; Zinbarg et al., 1997; Telch, Shermis, & Lucas, 1989).

In a study conducted by Telch et al. (1989), the factor structure of the ASI was examined using a sample of 401 males and 439 females enrolled in introductory psychology classes. The results of this study revealed four ASI factors. These factors included concerns of physical sensations, concerns of mental incapacitation, concerns of control, and concerns of heart and lung failure. Likewise, Cox et al. (1996) conducted a study to determine whether a multidimensional model would be a better model for the ASI than a unidimensional model. Using data collected from both a sample of undergraduate students and a sample of clinical patients diagnosed with panic disorder, confirmatory factor analyses were conducted to test both a unidimensional and multidimensional model of the ASI. The results revealed that, within this sample, there was no empirical support for a unidimensional model of the ASI. On the other hand, there was support for a multidimensional model of the ASI. The four factors that emerged included cognitive symptoms, symptoms in public, cardio-respiratory/gastrointestinal symptoms, and
trembling/fainting (Cox et al., 1996). However, Cox et al. (1996) caution that there may not be enough items in the ASI to produce reliable subscales.

The ASI consists of 16 items and there are typically only about 3 or four of these items in each subscale. With so few items in the ASI, the ability to adequately assess a multidimensional model of anxiety sensitivity may be compromised (Taylor & Cox, 1998). In response to concerns that there are too few items in the ASI to adequately assess its factor structure, Taylor and Cox (1998) developed the Anxiety Sensitivity Index-Revised, which consists of 36 items. This expanded measure of anxiety sensitivity was used to assess the domains of anxiety sensitivity that were reported in previous studies. Based on the results of factor analyses performed on 155 psychiatric outpatients, the authors found evidence for anxiety sensitivity as a hierarchical construct with four lower order factors and a single higher order factor on which all items load. The lower order factors include fear of respiratory symptoms, fear of publicly observable anxiety reactions, fear of cardiovascular symptoms, and fear of cognitive dyscontrol. These factors are similar to those reported
based on the 16-item version. Additionally, the hierarchical model of anxiety sensitivity reported in this study is consistent with the model reported by Zinbarg, Barlow, and Brown (1997), which was based on the 16-item version of the ASI. The results of the study conducted by Zinbarg et al. (1997) revealed three lower order factors and a single higher order factor. The three lower order factors that emerged included physical concerns, social concerns, and mental incapacitation (Zinbarg et al., 1997). These results are consistent with research conducted by Lillienfeld, Turner, and Jacob (1993) in which they found evidence that the ASI consists of lower order group factors and a single general factor.

The hierarchical model of the ASI has been accepted by researchers as a resolution to the controversy over whether anxiety sensitivity is a unidimensional or multidimensional construct (Lillienfeld et al., 1993; Zinbarg et al., 1997). It suggests that the ASI is unidimensional on a higher-order level and multidimensional on a lower-order level. Research conducted on adolescents between the ages of 13-16 indicates that the hierarchical model of anxiety sensitivity generalizes to individuals of different age
groups (Muris, Schmidt, Merckelbach, Schouten, 2001). Further, research has also found that the hierarchical model extends to both a clinical and non-clinical sample (Cox et al., 1996). However, research examining whether these factors extend to individuals of diverse ethnic groups has been virtually ignored. To date, no studies have examined the factor structure of the ASI in individuals of Latino heritage and only one published study has examined the factor structure of the ASI in African-Americans (Carter, Sbrocco, Suchday, and Lewis, 1999). Studies have found ethnic differences in the report of anxiety (Paradis, Friedman, Lazar, Grubea, & Kesselman, 1992; Roberts, Snowden & Miller, 1997; Salman, Liebowitz, Guarnaccia, Jusino, Garfinkel, Street, Cardenas, Silvestre, Fyer, Carrasco, Davies, & Klein, 1998). Therefore, research should examine whether the factors of the ASI that have been found in previous research extend to individuals of diverse ethnic backgrounds.

Research suggests that differences exist in the report of anxiety between African-Americans and Caucasian-Americans. For instance, the results of data collected from the Epidemiological Catchment Area (ECA)
study of more than 18,000 individuals revealed that African-Americans reported greater symptoms of agoraphobia and simple phobia than Caucasian-Americans (Paradis et al., 1992). Further, analysis of this same data and of separate ethnographic reports revealed that African-Americans express symptoms of anxiety in largely somatic terms (Roberts et al., 1997). A few of the commonly reported symptoms included gas/bloating, fainting/falling out, heart palpitations, sleeplessness, and tiredness. Research has also found that culture shapes the expression of anxiety for individuals of Latino heritage (Salman et al., 1998). Therefore, it is reasonable to suspect that cultural differences may lead to differences in the factor structure of the ASI when analyses are conducted on African-Americans, Latinos, and Caucasian-Americans separately.

The results of factor analyses conducted on other psychological measures indicate that different factors emerge across ethnic groups (Huebner, 1998; Neal, Lilly, & Zakis, 1993; Schmitz & Baer, 2001; Tansey & Miller, 1997; Tucker & Dyson, 1991). For instance, Schmitz and Baer (2001) conducted cross-cultural examination of the factor structure of the Emotional Autonomy Scale (EAS),
which is used to assess an individual’s level of autonomy and individuation. It was discovered that different factors emerge in this scale when it is administered to African-Americans, Mexican Americans, and Caucasian-Americans. Further, Neal et al. (1993) discovered that different factors existed when the Revised Fear Schedule for Children was administered to African-American and Caucasian-American participants. Analysis yielded a five-factor solution for Caucasian-American children, consisting of general fears, fear of the unknown and things that crawl, school fears, medical fears, and fear of embarrassment. In contrast, there were only three factors for African-American children. These factors included general fears, fear of the unknown and things that crawl, and medical fears (Neal et al., 1993). These findings provide support for the postulation that ethnic differences influence the factor structure of psychological measures. Therefore, it is necessary to examine whether the factors that have been found to exist on the ASI extend to individuals of African-American and Latino heritage. Research of this type has already been conducted by Carter et al. (1999).
Carter et al. (1999) examined the factor structure of the ASI in African-American college students and it was discovered that different factors emerged than those previously reported by others (e.g., Zinbarg, Mohlman, & Hong, 1997). For instance, the Physical Concerns factor that was found to exist by Zinbarg et al. (1997) was separated into two factors in the study conducted by Carter et al. (1999). These included the Cardiovascular Concerns factors and the Unsteady factor. It was also discovered that the Social Concerns factor reported by Zinbarg et al. (1997) did not exist among African-Americans. Instead, there existed an Emotional Control factor for this group. This suggests that to African-Americans, social concerns are not as important as being in control of one's emotions. Finally, Carter et al. (1999) found a Mental Incapacitation factor for African-Americans. This factor was composed of roughly the same items as Zinbarg et al. (1997). However, one important difference was that for African-Americans, the Mental Incapacitation factor included two additional items that belonged to the Social Concerns factor in the study conducted by Zinbarg et al. (1997). These two items were Item 13, "Other people notice when I feel shaky" and
Item 7, "It embarrasses me when my stomach growls".

In summary, Carter et al. (1999) discovered that different factors of the ASI emerge for African-Americans than those that were previously reported with a Caucasian-American sample (Zinbarg et al., 1997). Therefore, the current study seeks to examine the factor structure of the ASI in three ethnic groups. To determine whether differences exist in the factor structure of the ASI across ethnic groups, separate analyses will be conducted on ASI data collected from African-Americans, Latinos, and Caucasian-Americans. Using confirmatory factor analyses (CFA's), we will examine the goodness of fit of the models presented by both Zinbarg et al. (1997) and Carter et al. (1999) to determine which model provides the better fit of the data collected from each ethnic group. It is expected that the factors that emerge for African-Americans will be the same as those reported by Carter et al. (1999). However, it is expected that the factors that emerge for Caucasian-Americans will be the same as those reported by Zinbarg et al. (1997). Since no research has examined the factor structure of the ASI using a Latino sample, no hypothesis has been formulated concerning which model
will provide a better fit of the data collected from this group.
Participants

Participants for this study consisted of 386 college students enrolled in psychology courses at California State University, San Bernardino. Of these, 94 self-identified as African-American, 157 as Caucasian-American, and 135 as Latino. Of the African-American participants, 14 were male and 80 were female. The average age of this group was 25.78 years old (SD = 9.14). Of the Caucasian-American participants, 42 were male, 114 were female, and 4 undeclared. The average age for this group was 28.6 years old (SD = 9.86). Of the Latino participants, 37 were male, 97 were female, and 1 was undeclared. The average age for this group was 24.98 years old (SD = 6.98). Extra credit points were given to participants as an incentive for participation. Each participant was given a questionnaire packet and presented with an informed consent statement outlining the nature of the study, the risks and benefits of participation, and the participants' rights to terminate...
participation at any time. A debriefing sheet was also included at the end of each packet.

Measures

Demographics Scale - This scale was constructed by the experimenters and was designed to assess participant's status on a variety of demographic variables. Questions regarding income, educational level, sex, age, and family background are included.

Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986). This is a 16 item, 5-point likert-type scale designed to assess an individual's belief that experiencing symptoms of anxiety will lead to illness, embarrassment, or additional anxiety. Responses range from 0 (very little) to 4 (very much), with higher scores denoting the belief that the experience of anxiety is associated with negative consequences. A typical item includes, "It scares me when my heart beats rapidly". The test retest reliability as reported by Reiss et al. (1986) was .75. The alpha reliability for the current sample was .90.
Statistical Analysis

Confirmatory Factor Analyses

For each ethnic group, confirmatory factor analyses were conducted through EQS to compare the goodness of fit of the models reported by Zinbarg et al. (1997) (see Figure 1) and Carter et al. (1999) (see Figure 2). A second order factor analysis was conducted to determine if a secondary factor exists on which all items are expected to load.

Ethnic Differences on Measures

One-way ANOVA'S were conducted to assess ethnic differences in participant responses to questionnaire items. Before assessing these differences, missing data for the questionnaire items was corrected by replacing missing values with the ethnic group mean for each of the missing items. Adjusted annual income was calculated by dividing the total annual income for each household by the number dependents reported.
CHAPTER THREE
RESULTS

Confirmatory Factor Analysis

Assumptions

The assumptions of multivariate normality and linearity were evaluated for each ethnic group through EQS. Mardia’s Normalized Estimate suggested that the measured variables were not normally distributed (African-Americans, $z = 16.26$; Latinos, $z = 17.82$; Caucasian-Americans, $z = 24.04$). Therefore, the analysis was continued using the maximum likelihood estimation with the Satorra Bentler scaled chi-square statistic, which adjusts for non-normality (Bentler & Dijkstra, 1985).

Model Estimation

Model Proposed by Zinbarg et al. (1997)

The analysis revealed that Zinbarg’s model (see Figure 1) did not provide an adequate fit of the data collected from any of the three ethnic groups. Even when the Satorra Bentler scaled chi-square statistic was used, Robust comparative fit (CFI) indexes were below .90.
(African-Americans = .876; Latinos = .83; Caucasian-Americans = 1.0).

Model Proposed by Carter et al. (1999)

African-American Sample

The independence model that tests the hypothesis that the variables are uncorrelated with one another was easily rejected, $\chi^2 (91, N = 94) = 689.52, p < .001$. There was support for the hypothesized model in terms of the Satorra-Bentler scaled $\chi^2$ test statistic and comparative fit (CFI) index, $\chi^2 (73, N = 94) = 106.38, p < .001$, Robust CFI = .92. As indicated in Figure 3, 85% of the variance in the Mental Incapacitation factor is accounted for by its predictors and 63% of the variance in the Unsteady factor is accounted for by its predictors. It was also discovered that 14% percent of the variance in the Emotional Control factor is accounted for the by its predictors and 45% of the variance in the Cardiovascular Concerns factor is accounted for by its predictors (see Figure 3).

1 During the analysis, a condition code indicated that the results may not be appropriate because the third parameter was constrained at lower bound.
Latino Sample

The independence model that tests the hypothesis that the variables are uncorrelated with one another was easily rejected, $\chi^2 (91, N = 135) = 764.03, p < .001$. There was support for the hypothesized model in terms of the Satorra-Bentler scaled $\chi^2$ test statistic and comparative fit (CFI) index, $\chi^2 (73, N = 135) = 100.74, p < .001$, Robust CFI = .91. As indicated in Figure 4, 86% of the variance in the Mental Incapacitation factor is accounted for by its predictors and 66% of the variance in the Unsteady factor is accounted for by its predictors. It was also discovered that 23% percent of the variance in the Emotional Control factor is accounted for by its predictors and 69% of the variance in the Cardiovascular Concerns factor is accounted for by its predictors (see Figure 4).

Caucasian-American Sample

The independence model that tests the hypothesis that the variables are uncorrelated with one another was easily rejected, $\chi^2 (91, N = 157) = 976.27, p < .001$. There was support for the hypothesized model in terms of the Satorra-Bentler scaled $\chi^2$ test statistic and
comparative fit (CFI) index, $\chi^2 (73, \ N = 157) = 118.93, p < .001$, Robust CFI = .92. As indicated in Figure 5, 63% of the variance in the Mental Incapacitation factor is accounted for by its predictors and 79% of the variance in the Unsteady factor is accounted for by its predictors. It was also discovered that 21% percent of the variance in the Emotional Control factor is accounted for by its predictors and 80% of the variance in the Cardiovascular Concerns factor is accounted for by its predictors (see Figure 5).

Ethnicity as a Moderator

To determine whether ethnicity moderated the factor structure of the ASI, additional factor analyses were conducted. First, a baseline model was created through EQS, in which each ethnic group was entered in the model simultaneously and all of the measurement items were free to vary. The measurement items were then constrained to determine whether forcing the items to be equal across the ethnic groups would degrade the model. Finally, we constrained the factors to determine whether differences existed in the factors that emerge across each ethnic group.
A chi square difference test indicated that constraining the measurement items significantly degraded the model, \( \chi^2_{diff} (20, N = 386) = 34.37, p < .05 \). To improve the model we released Item 2, allowing it to be estimated differently between African-Americans and Caucasian-Americans. After releasing this item, the model was improved and no other items needed to be released \( \chi^2_{diff} (19, N = 386) = 29.73, p > .05 \). A chi square difference test also revealed that there were no differences among the ethnic groups when the factors were constrained, \( \chi^2_{diff} (6, N = 386) = 9.645, p > .05 \).

Ethnic Differences on Measures

One-way ANOVA's were conducted to assess ethnic differences on the measurement items. Table 4 summarizes the results of the F-tests. The mean adjusted annual income was 22,955.04 (SD = 18,370.23) for African-Americans, 19,208.34 (SD = 18,957.34) for Latinos and 34,328.28 (SD = 23,753.25) for Caucasian-Americans. Caucasian-Americans had a greater adjusted annual income than African-Americans, \( F (1, 250) = -4.24, p < .001 \). Analysis also revealed that Caucasian-Americans had a greater adjusted annual income Latinos, \( F (1, 291) = - \).
6.16, \( p < .001 \). The mean total score on the ASI was 17.86 (SD = 11.74) in African-Americans, 18.03 (SD = 10.58) in Latinos, and 16.83 (SD = 10.33) in Caucasian-Americans. There was no difference in the mean total score of the ASI across ethnic groups.

Ethnic differences in the factors proposed by Carter et al. (1999) were also examined. The mean score on the ASI-Mental Incapacitation Factor was 3.01 (SD = 4.18) in African-Americans, 2.80 (SD = 3.26) in Caucasian-Americans, and 3.17 (SD = 3.76) in Latinos. There was no difference in participants' fear of mental incapacitation based on ethnic background. The mean score on the ASI-Unsteady Factor was 3.53 (SD = 3.03) in African-Americans, 3.72 (SD = 2.84) in Caucasian-Americans, and 3.60 (SD = 2.86) in Latinos. There was no difference in participants' fear of feeling unsteady based on ethnic background. The mean score on the ASI-Emotional Control Factor was 5.00 (SD = 2.36) in African-Americans, 4.86 (SD = 2.07) in Caucasian-Americans, and 5.59 (SD = 1.80) in Latinos. Latino participants reported greater fears of losing emotional control than Caucasian-Americans, \( F(1, 250) = 3.04, p < .01, \eta^2 = \)
.025. The mean score on the ASI-Cardiovascular Concerns Factor was 4.26 (SD = 3.99) in African-Americans, 3.60 (SD = 3.50) in Caucasian-Americans, and 3.48 (SD = 3.55) in Latinos. There was no difference in participants' report of cardiovascular concerns based on ethnic background.
The purpose of the present study was to examine the fit of the hierarchical models presented by Zinbarg et al. (1997) and Carter et al. (1999) in data collected from African-American, Caucasian-American, and Latino college students. For each ethnic group, separate confirmatory factor analyses were conducted to test the models proposed by Zinbarg et al. (1997) and Carter et al. (1999). The results of the analysis found no empirical support for the three-factor hierarchical model of the ASI that was reported by Zinbarg et al. (1997). In each of the three ethnic groups, the goodness of fit indices suggested that the three-factor hierarchical model did not provide an adequate fit of the data. Specifically, the analysis revealed that the Social Concerns factor did not exist in data from the current study. This does not support the hypothesis that the model proposed by Zinbarg et al. (1997) will fit the data collected from the Caucasian-American sample, but not the data collected from the African-American sample. However, there was support for the four-factor
hierarchical model that was reported by Carter et al. (1999). For each ethnic group, goodness of fit indices suggested that this model had a good fit to the data.

Based on the results of research conducted on a sample of African-American college students, Carter et al. (1999) proposed that the ASI measures a hierarchical construct with four lower-order factors and a single higher-order factor on which all items load. The four lower-order factors that emerged were Mental Incapacitation, Unsteady, Emotional Control, and Cardiovascular Concerns. In the current study, this factor structure fit the data collected from African-Americans, Caucasian-Americans, and Latinos. This did not support the hypothesis that the model proposed by Carter et al. (1999) would fit the data collected from the African-American sample, but not the data collected from the Caucasian-American sample.

When analyses were conducted to determine if ethnicity moderated the factor structure of the ASI, it was discovered that overall, the three ethnic groups were strikingly similar. The only difference among the groups was concerning one of the items in the Mental Incapacitation Factor. The analysis revealed a
difference between African-Americans and Caucasian-Americans in the strength of the factor loading for Item 2, which states, "When I cannot keep my mind on task, I worry that I might be going crazy". The factor loading for this item was .72 in the African-American sample, and .48 in the Caucasian-American sample. Future research should be conducted to determine whether there is any relationship between this finding and differences in the cultural experiences of African-Americans and Caucasian-Americans.

It was expected that ethnic differences would account for differences in the fit of the models proposed by Carter et al. (1999) and Zinbarg et al. (1997) across the three ethnic groups. However, within the limits of this study, no ethnic differences in the fit of these models emerged. Instead, differences in the fit of the models appear to be related to the use of college students to test these models. Participants from the present study consisted of a non-clinical sample of college students. Similarly, the model proposed by Carter et al. (1999) was based on data collected from a sample of African-American college students. On the
other hand, the study conducted by Zinbarg et al. (1997) was based on a sample of individuals diagnosed with anxiety disorders. Although it was initially expected that differences in the fit of the two models were due to ethnic group differences in the samples used by Carter et al. (1999) and Zinbarg et al. (1997), the results of the current study suggest that this was not the case. Instead, it appears that these differences may be due to the distinct characteristics of a clinical versus a non-clinical sample. Since the model reported by Zinbarg et al. (1997) was based on analyses conducted on a clinical sample, this may explain why it did not fit data collected from any of the three ethnic groups in the current study.

Previous research suggests that differences exist in the factor structure of some psychological measures based on the sample that researchers use to examine this structure (Burgoyne, 2001; Huebner, 1998; Lapiene, 1999; Neal, Lilly, & Zakis, 1993; Schmitz & Baer, 2001; Silverman, Ginsburg, & Goedhart, 1999; Tansey & Miller, 1997; Tucker & Dyson, 1991). Some researchers have found that the factor structure of a scale changes when a clinical sample is used versus a non-clinical sample.
(Burgoyn, 2001; Lapiene, 1999; Silverman, Ginsburg, & Goedhart, 1999). For instance, in a study conducted by Silverman et al. (1999) the factor structure of the Childhood Anxiety Sensitivity Index (CASI; Silverman, Fleisig, Rabian, & Peterson, 1991) was examined in both a clinical and non-clinical sample of children between 7 and 13 years of age. The CASI is an 18-item scale that was developed to measure anxiety sensitivity in children. The first 16 items show identical correspondence to the items on the ASI, with changes made to the wording of some items. The results of this study revealed that there were slight differences between the clinical and non-clinical sample in the factor structure of the CASI for these two groups. The Social Concerns Factor that Zinbarg et al. (1997) reported was found to exist in the clinical sample, but was less robust in the non-clinical sample (Silverman et al., 1999). The item-rest correlation between the two items that made up the Social Concerns Factor was below the acceptable criteria of .30 in the non-clinical sample, suggesting that the factor was less reliable for this group (Silverman et al., 1999). The results of the current study provides support for this finding, since CFA’s revealed that Zinbarg’s
Social Concerns factor did not exist in the college sample. It is possible that concern over the social consequences of anxiety symptoms (e.g., appearance of being anxious to others) may be more characteristic of those with anxiety symptoms that lead to social and occupational dysfunction or severe distress (i.e., DSM anxiety disorders) than those in the general population. To determine whether this is the case, further research should be conducted examining the factor structure of the ASI in an adult sample of clinical and non-clinical participants who have been matched on age, education, and other demographic variables.

The finding that no ethnic differences emerged in the factor structure of the ASI suggests that ethnic differences in the factor structure of this measure do not exist. However, it should be cautioned that this study was conducted on a relatively small sample of college students and the results may not be representative of individuals in the community. It is reasonable to suspect that individuals who attend college come from similar backgrounds and share common experiences. Therefore, college students may be more similar than different, regardless of their ethnic
background. In order to determine whether individuals of different ethnic backgrounds have unique fears regarding the consequences of experiencing anxiety symptoms, research should be conducted on individuals who have different life experiences as a result of their ethnicity. In light of this, the use of a college sample may inhibit the ability to detect the cross-cultural differences that exist in the community. A similar line of research should be conducted on a sample of individuals in the community.

It is also possible that an individual's level of acculturation to the mainstream culture may moderate the structure of anxiety sensitivity. Individuals who are more acculturated to this culture and less affiliated to their own ethnicity may experience anxiety sensitivity in a similar as Caucasian-Americans. Roberts et al. (1997) speculated that culture may influence the way that African-Americans experience anxiety symptoms. Further, Carter et al. (1999) hypothesized that African-Americans who are less acculturated may experience anxiety sensitivity in a manner that is similar to that of Caucasian-Americans. Therefore, if the African-American and Latino participants in the current study are less
ethnically affiliated and are not involved in the cultural practices of their ethnic group, this would explain why ethnic differences in the factor structure of the ASI did not emerge. Future research should examine the role of acculturation in the experience of anxiety sensitivity among ethnically diverse individuals.

The current study provides support for the hierarchical model of the ASI that has been reported by other researchers (Carter et al., 1999; Muris et al., 2000; Lillienfeld et al., 1993; Zinbarg et al., 1997;). This suggests that the ASI measures a unidimensional construct on a higher order level and a multidimensional construct on a lower order level. The hierarchical model seems to resolve the controversy over whether the ASI is a single factor measure or consists of multiple factors. There was no evidence that ethnic differences exist in the factor structure of the ASI. CFA’s revealed that the factor structure of the ASI was virtually the same across the three ethnic groups. Carter et al. (1999) discovered a different factor structure than Zinbarg et al. (1997) when he conducted his analysis on African-American college students and speculated that this was due to ethnic differences among the samples. However, the
results of the current study raise the question of whether this difference was due to the use of a non-clinical sample in the study conducted by Carter et al. (1999) versus a clinical sample in the study conducted by Zinbarg et al. (1997).

In the current study, the model proposed by Zinbarg et al. (1997) did not fit the data collected from any of the three ethnic groups. On the other hand, the model proposed by Carter et al. (1999) fit the data from each of the three groups. Similar to the study conducted by Carter et al. (1999), the present study was based on data from a non-clinical sample. Since Zinbarg et al. (1997) conducted analyses based on data from a clinical sample, it is possible that the factors of the ASI that emerge in a clinical sample are not the same as those that emerge in a non-clinical sample. Due to the clinical implications of using ASI factors to treat individuals with panic and other anxiety disorders, future research is definitely needed in this area.
Table 1

Zero-Order Correlations Among the Factors in the African-American Sample

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mental Incapacitation</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Unsteady</td>
<td></td>
<td>.584</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Emotional Control</td>
<td></td>
<td>.220</td>
<td>.311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cardiovascular Concerns</td>
<td></td>
<td>.582</td>
<td>.543</td>
<td>.210</td>
<td></td>
</tr>
<tr>
<td>5. ASI-total</td>
<td></td>
<td>.848</td>
<td>.782</td>
<td>.472</td>
<td>.813</td>
</tr>
</tbody>
</table>

Note: Correlations greater than .19 are significant at \( p < .05 \).
Table 2

Zero-Order Correlations Among the Factors in the Latino Sample

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mental Incapacitation</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Unsteady</td>
<td>.606</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Emotional Control</td>
<td>.251</td>
<td>.365</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cardiovascular Concerns</td>
<td>.657</td>
<td>.527</td>
<td>.278</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>5. ASI-total</td>
<td>.867</td>
<td>.795</td>
<td>.493</td>
<td>.833</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Correlations greater than .19 are significant at p < .05.
Table 3

Zero-Order Correlations Among the Factors in the Caucasian-American Sample

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mental Incapacitation</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Unsteady</td>
<td>.612</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Emotional Control</td>
<td>.245</td>
<td>.351</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cardiovascular Concerns</td>
<td>.620</td>
<td>.675</td>
<td>.318</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>5. ASI-total</td>
<td>.820</td>
<td>.844</td>
<td>.526</td>
<td>.866</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Correlations greater than .19 are significant at $p < .05$. 
### Table 4

**Ethnic Differences on Dependent Measures**

<table>
<thead>
<tr>
<th>Dependent Measure</th>
<th>African Americans</th>
<th>Latinos</th>
<th>Caucasian Americans</th>
<th>F (385)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted Income</td>
<td>22,955.04</td>
<td>19,208.34</td>
<td>34,328.28</td>
<td>20.53**</td>
</tr>
<tr>
<td>ASI-Total Score</td>
<td>17.86</td>
<td>18.03</td>
<td>16.83</td>
<td>.515</td>
</tr>
<tr>
<td>ASI-Mental Incapacitation</td>
<td>3.01</td>
<td>3.17</td>
<td>2.80</td>
<td>.374</td>
</tr>
<tr>
<td>ASI-Unsteady</td>
<td>3.53</td>
<td>3.59</td>
<td>3.72</td>
<td>.152</td>
</tr>
<tr>
<td>ASI-Emotional Control</td>
<td>5.00</td>
<td>5.59</td>
<td>4.86</td>
<td>4.95**</td>
</tr>
<tr>
<td>ASI-Cardiovascular Concerns</td>
<td>4.26</td>
<td>3.48</td>
<td>3.60</td>
<td>1.41</td>
</tr>
</tbody>
</table>

**p < .01**
APPENDIX B

FIGURES
FIGURE CAPTIONS

Figure 1. The Three Factor Model of the ASI as Proposed by Zinbarg et al. (1997).

Figure 2. The Four Factor Model of the ASI as Proposed by Carter et al. (1999).

Figure 3. Final CFA Model in African-American Sample With Significant Coefficients Presented in Standardized Form.

Figure 4. Final CFA Model in Latino Sample With Significant Coefficients Presented in Standardized Form.

Figure 5. Final CFA Model in Caucasian-American Sample With Significant Coefficients Presented in Standardized Form.
Physical Concerns

Mental Incapacitation

Social Concerns

Anxiety Sensitivity

Item 6
Item 10
Item 9
Item 4
Item 14
Item 3
Item 11
Item 8
Item 2
Item 15
Item 12
Item 16
Item 1
Item 5
Item 3
When nervous, I worry that I might be mentally ill (15). 

When cannot keep mind on a task, I worry that I might be mentally ill (2).

It scares me when I am nervous (16).

It scares me when I am unable to keep my mind on a task (12).

Unusual body sensations scare me (14).

It scares me when I feel faint (4).

It scares me when I am nauseous (8).

It scares me when I feel shaky (3).

It is important to stay in control of my emotions (5).

It is important to me not to appear nervous (1).

When I notice my heart is beating rapidly, I worry that I might have a heart attack (9).

It scares me when I am short of breath (10).

When my stomach is upset, I worry that I might be seriously ill (11).

It scares me when my heart beats rapidly (6).

---

Unsteady

R^2 = .63

R^2 = .14

Anxiety Sensitivity

R^2 = .45

Mental Incapacitation

R^2 = .85

 Emotional Control

R^2 = .80*

Cardiovascular Concerns
When nervous, I worry that I might be mentally ill (15).

When cannot keep mind on a task, I worry that I might be mentally ill (2).

It scares me when I am nervous (16).

It scares me when I am unable to keep my mind on a task (12).

Unusual body sensations scare me (14).

It scares me when I feel faint (4).

It scares me when I am nauseous (8).

It scares me when I feel shaky (3).

It is important to stay in control of my emotions (5).

It is important to me not to appear nervous (1).

When I notice my heart is beating rapidly, I worry that I might have a heart attack (9).

It scares me when I am short of breath (10).

When my stomach is upset, I worry that I might be seriously ill (11).

It scares me when my heart beats rapidly (6).

\( R^2 = 0.86 \)

\( R^2 = 0.66 \)

\( R^2 = 0.23 \)

\( R^2 = 0.69 \)
When nervous, I worry that I might be mentally ill (15).

When cannot keep mind on a task, I worry that I might be mentally ill (2).

It scares me when I am nervous (16).

It scares me when I am unable to keep my mind on a task (12).

Unusual body sensations scare me (14).

It scares me when I feel faint (4).

It scares me when I am nauseous (8).

It scares me when I feel shaky (3).

It is important to stay in control of my emotions (5).

It is important to me not to appear nervous (1).

When I notice my heart is beating rapidly, I worry that I might have a heart attack (9).

It scares me when I am short of breath (10).

When my stomach is upset, I worry that I might be seriously ill (11).

It scares me when my heart beats rapidly (6).

\[ R^2 = .63 \]

\[ R^2 = .79 \]

\[ R^2 = .21 \]

\[ R^2 = .90 \]

\[ R^2 = .80 \]
APPENDIX C

QUESTIONNAIRE
Items on the Anxiety Sensitivity Index

Rate each item by selecting one of the five phrases for each of the sixteen questions.
Range: "very little" through "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.
4. It scares me when I feel faint.
5. It is important to me to stay in control of my emotions.
6. It scares me when my heart beats rapidly.
7. It embarrasses me when my stomach growls.
8. It scares me when I am nauseous.
9. When I notice my heart is beating rapidly, I worry that I might have a heart attack.
10. It scares me when I become short of breath.
11. When my stomach is upset, I worry that I might be seriously ill.
12. It scares me when I am unable to keep my mind on a task.
13. Other people notice when I feel shaky.
14. Unusual body sensations scare me.
15. When I am nervous, I worry that I might be mentally ill.
16. It scares me when I am nervous.
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structure in a clinical sample. *Journal of Anxiety Disorders, 12 (5), 463 - 483.*


