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Dimensions of Anxiety Sensitivity and Their Relationship to Nonclinical Panic

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The goal of the present study was to examine the factor structure of the Anxiety Sensitivity Index (ASI; S. Reiss, R. A. Peterson, D. M. Gursky, & R. J. McNally, 1986) and the replicability, reliability, and validity of its dimensions in a nonclinical sample. One-thousand-and-seventy-one undergraduate volunteers completed the ASI and a modified version of the Panic Attack Questionnaire (PAQ; G. R. Norton, J. Dorward, & B. J. Cox, 1986). A principal components analysis, using oblique rotation and parallel analysis, yielded three ASI dimensions that were highly consistent with those reported in previously published studies. Individuals classified as nonclinical panickers scored higher than nonpanickers on the Physical Concerns and Cognitive Concerns subscales of the ASI. Although spontaneous panic attacks were not significantly related to scores on any ASI scale, the occurrence of panic attacks in the past month was related to higher scores on the Cognitive Concerns subscale. The results are discussed in terms of cognitive theories of panic, and limitations of the present study and directions for future research are addressed.

KEY WORDS: anxiety sensitivity; nonclinical panic; factor structure; anxiety.

According to expectancy theory (Reiss, 1991; Reiss & McNally, 1985), anxiety sensitivity (AS) is an individual difference variable consisting of the fear of anxiety-related sensations based on the belief that these symptoms have harmful consequences. An individual with high AS may, for example, believe that heart palpitations are a sign of an impending heart attack, or that the inability to concentrate is a sign that one is going crazy. AS is thought to be acquired through a variety of mechanisms, including experience with panic (Goldstein and Chambless, 1978); observational learning; cognitive learning (Watt, Stewart, & Cox, 1998); biological constitution (Stein, Lang, Livesley, 1999); and personality needs to avoid illness, embarrassment, or to maintain control (Reiss & McNally, 1985). Elevated AS is believed to increase an individual's risk for developing anxiety disorders, and panic disorder in particular, because it amplifies the negative valence of anxiety reactions (Reiss & McNally, 1985). Individuals with high AS are thought to experience increasing anxiety in response to their own anxiety reactions, resulting in a positive feedback cycle that may produce panic attacks and ultimately result in panic disorder if the panic attacks are accompanied by significant worry or lifestyle change (*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., American Psychiatric Association, 1994).

The Anxiety Sensitivity Index (ASI; Reiss et al., 1986) was developed to assess individual differences pertaining to beliefs about the harmful consequences of anxiety. Since the initial validation of the ASI, dozens of studies have established the reliability and validity of the scale in a diverse range of clinical and nonclinical samples. High ASI scores have been associated with a diagnosis of panic disorder as opposed to other anxiety disorders (e.g., Taylor, Koch, & McNally, 1992), anxious responding to panic challenge tasks (e.g., Rapee & Medoro, 1994), and prospective development of panic attacks (e.g., Schmidt, Lerew, & Jackson, 1997, 1999). Consistent with the theory that elevated AS drives the vicious circle of panic, even among individuals without panic disorder (Reiss & McNally, 1985; Reiss, 1987), elevated ASI scores

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have been found among individuals with nonclinical panic (NCP; panic attacks that are not severe enough to lead individuals to seek treatment). Nonclinical panickers have been shown to score significantly higher on the ASI than nonpanickers do (Brown & Cash, 1990; Brown & Deagle, 1992), but lower on the ASI than clinical panickers do (Cox, Endler, & Swinson, 1991; Rapee, Ancis, & Barlow, 1988), suggesting that nonclinical panickers exist on a continuum of severity between nonpanickers and clinical panickers.

The factor structure of the ASI has been a topic of some debate and appears particularly relevant for assessing the construct validity of AS. Although research on the factor structure of the ASI has been characterized by widely discrepant results arrived at by varying statistical methods, common themes have emerged that appear to clarify the issue. Lilienfeld, Turner, and Jacob (1993) suggested that AS consists of several correlated lower-order factors that load on a single higher-order factor (i.e., general AS). Consistent with this hypothesis, mounting evidence suggests that three lower-order ASI dimensions exist: (a) fears of somatic sensations, (b) fears of cognitive consequences of anxiety, and (c) fears of publicly observable symptoms. Recent three-factor ASI solutions obtained from exploratory factor analyses by Stein et al. (1999), Stewart, Taylor, and Baker (1997), Taylor, Koch, Woody, and McLean (1996), and Zinbarg, Barlow, and Brown (1997) have each demonstrated this patten. Zinbarg et al. (1997) argued that the debate regarding the factor structure of the ASI has been largely resolved by the hierarchical model proposed by Lilienfeld et al. (1993; cf. Carter, Miller, Sbrocco, Suchday, & Lewis, 1999).

The observation that multiple factors exist within the ASI raises the issue of the possible differential validity of the factors. Several published studies have demonstrated that different ASI dimensions possess differential validity with respect to a range of variables including depression and anxiety symptoms (Schmidt, Lerew, and Joiner, 1998), anxiety disorder diagnosis (Zinbarg et al., 1997), ethnicity (Carter et al., 1999), gender (Stewart et al., 1997), response to laboratory panic induction (Carter, Suchday, & Gore, in press), heritability (Stein et al., 1999), and prospective development of panic attacks (Schmidt et al., 1999). The observation that different AS domains affect clinically relevant variables in different ways strongly suggests that researchers need to examine relationships between criterion variables relevant to AS (e.g., vulnerability to panic, response to panic provocation, treatment response) and ASI dimensions. Such investigations are necessary to refine our understanding of anxiety disturbances, as well as to clarify the extent to which studying dimensions of AS is more useful than studying it as a unidimensional construct.

Studies of nonclinical panic attacks are often viewed as an opportunity to understand mechanisms that give rise to panic disorder (Norton, Cox, & malan, 1992). Although different AS dimensions have been implicated as unique risk factors for the development of panic attacks and panic disorder (e.g., Zinbarg et al., 1997), only one published study (Schmidt et al., 1999) has examined the role of lower-order AS domains in the experience of nonclinical panic. The present study was conducted to help us better understand the role of AS dimensions in nonclinical panic and related symptomatology. Specifically, the present study examined the lower-order factor structure of the ASI and explored the validity of its dimensions with respect to the presence of NCP, spontaneous panic attacks, and frequent panic attacks.

METHOD

Participants

Study participants ($N = 1071$) were recruited from introductory psychology classes at a midsized Midwestern university and received partial course credit for their participation. The sample consisted of 352 men and 716 women (three participants did not report their gender). The mean age was 19.6 years ($SD = 2.4$). The majority of the participants identified themselves as Caucasians ($n = 672$; 62.7%), followed by 195 African Americans (18.2%), 93 Asians or Asian Americans (8.7%), 60 Hispanics (5.6%), and 54 participants of other or unreported ethnicities (5.0%).

Measures

Nonclinical Panic

Participants completed a modified version of the Panic Attack Questionnaire (PAQ; Norton et al., 1986). To reduce the number of false positives identified by the PAQ, the questionnaire used a description of panic attacks designed to help participants differentiate the experiences of mild anxiety or stress from panic (Brown and Cash, 1989).The definition of a panic attack was followed by several questions assessing history of unexpected (spontaneous) panic attacks, panic attack frequency during the past month and past year, and the severity of the 13 *DSM-IV* (1994) panic attack symptoms experienced during participant's worst attack during the past year. Nonclinical panickers were defined as participants reporting having had a panic attack during the past year that was accompanied by at least four symptoms rated as

moderately severe or worse on a 5-point Likert-type scale ranging from 0 (*did not occur*) to 4 (*very severe*). "Spontaneous panickers" were defined as nonclinical panickers who reported a history of unexpected panic attacks. "Frequent panickers" were defined as nonclinical panickers who reported having had a panic attack in the past month. Nonpanickers were defined as those individuals who reported no history of panic attacks. Participants reporting a history of panic attacks who did not meet the criteria for nonclinical panic (e.g., limited-symptom panickers; $n = 166$), as well as participants with missing PAQ data ($n = 11$), were excluded from all analyses comparing nonclinical panickers and nonpanickers.

Anxiety Sensitivity

The Anxiety Sensitivity Index (ASI; Reiss et al., 1986) is a self-report questionnaire that assesses participants' beliefs about the harmful consequences of anxiety. Participants were asked to rate their agreement with each of 16 self-statements on a 5-point Likert-type scale ranging from 0 (*very little*) to 4 (*very much*). ASI total scores were calculated by summing participants' responses to each item. The ASI has been shown to have excellent psychometric properties in both clinical and nonclinical samples (Peterson & Reiss, 1992).

Procedure

Participants completed a questionnaire packet that included the ASI and modified PAQ. Participants signed consent forms prior to data collection and were informed that their responses would be kept completely confidential and that they were free to withdraw at any time without penalty.

RESULTS

Nonclinical Panic: Prevalence and Characteristics

One-hundred twenty-three participants (11.5% of the total sample) were classified as nonclinical panickers. The nonclinical panicker sample consisted of 31 men and 92 women, and the mean age was 19.4 years ($SD = 1.5$). The majority of nonclinical panickers were Caucasian ($n = 71$, 57.7%), followed by 22 African Americans (17.9%), 16 Hispanics (13.0%), 5 Asians or Asian Americans (4.1%), and 9 participants of other or unreported ethnicities (7.3%). Seventy-nine nonclinical panickers (64.2%) reported having experienced an unexpected panic attack and were classified as spontaneous panickers; the remaining 44 (35.8%) nonclinical panickers were classified as situational panickers. Nonclinical panickers were also classified into those individuals who reported having a panic attack during the past month (frequent panickers; $n = 56$; 45.5%) and those without a panic attack in the past month (infrequent panickers; $n = 67$; 54.5%). Frequent panickers reported experiencing significantly more panic attacks in the past year ($M = 8.2$, $SD = 12.7$) than did infrequent panickers ($M = 2.0$, $SD = 1.6$), $t\,(121) = -4.20$, $p < .01$. Nonclinical panickers did not differ from nonpanickers with respect to age or gender. A chi-square for differences in ethnicity between nonclinical panickers and nonpanickers was statistically significant, χ^2 (5, $N = 890$) $= 21.77$, $p < .01$. The prevalence of Caucasians and African Americans in the nonpanicker group (64.6% and 18.6%, respectively) was similar to the percentage of these groups represented in the nonclinical panicker group; however, Hispanics were underrepresented in the nonpanicker group (4.3%) and Asian Americans were overrepresented in the nonpanicker group (9.1%).

ASI Factor Structure

The factor structure of the ASI was examined in the total sample, using principal components analysis with oblique (i.e., oblimin) factor rotation. The number of factors to retain was determined by parallel analysis (Horn, 1965; Longman, Cota, Holden, & Fekken, 1989). Parallel analysis, a statistical procedure for determining the break in the scree plot, has been shown to provide accurate estimates of the number of factors to retain across varying sample conditions (Zwick & Velicer, 1986). Based on the recommendations of Longman et al. (1989), parallel analyses were conducted twice, once using the mean eigenvalues and once using the 95th percentile eigenvalues.

Parallel analysis of the ASI indicated a three-factor solution for both the mean and 95th percentile eigenvalues that accounted for 51.4% of the item variance. Based on the criterion of $\geq |.40|$ as a salient loading, the three-factor solution had adequate simple structure (Thurstone, 1947). One item had no salient factor loading ("It embarrasses me when my stomach growls"), no items loaded on more than one factor, and each factor had an adequate number of items with salient loadings (Factor I had six, Factor II had seven, Factor III had two). Principal components analyses were conducted separately for nonclinical panickers and nonpanickers to examine the comparability of the ASI's factor structure in these groups. Parallel analysis indicated highly similar three-factor solutions for both samples. Table I displays the factor loadings and eigenvalues

Table I. Pattern Matrix from Principal Components Analyses of the Anxiety Sensitivity Index Items: Obliquely-Rotated Factor Loadings for the Three-Factor Solution for the Total Sample, Nonclinical Panickers, and Nonpanickers

ASI item no.	Description	Factor 1: Physical concerns			Factor 2: Cognitive concerns			Factor 3: Social concerns		
		Total (1,071)	NCP (123)	NP (771)	Total (1,071)	NCP (123)	NP (771)	Total (1,071)	NCP (123)	NP (771)
6.	It scares me when my heart beats rapidly.	**.88**	**.80**	**.79**	.00	−.16	.01	−.03	−.02	−.04
4.	It scares me when I feel faint.	**.86**	**.81**	**.85**	.16	−.04	.15	.11	−.07	.04
10.	It scares me when I become short of breath.	**.77**	**.72**	**.78**	−.01	.04	−.01	−.10	.10	−.02
3.	It scares me when I feel “shaky” (trembling).	**.68**	**.67**	**.71**	−.07	.08	.00	.18	.15	.18
8.	It scares me when I am nauseous.	**.66**	**.58**	**.67**	−.07	.16	−.08	.08	.12	.04
9.	When I notice that my heart is beating rapidly, I worry that I might have a heart attack.	**.45**	**.50**	**.47**	−.26	−.11	−.27	−.35	−.10	−.38
15.	When I am nervous, I worry that I might be mentally ill.	−.16	−.24	−.14	**−.82**	**.77**	**−.79**	−.13	−.25	−.12
2.	When I cannot keep my mind on a task, I worry that I might be going crazy.	−.11	−.04	−.13	**−.79**	**.73**	**−.81**	.09	.21	−.06
16.	It scares me when I am nervous.	.07	.07	.10	**−.69**	**.64**	**−.67**	.10	.17	.13
12.	It scares me when I am unable to keep my mind on a task.	.04	.18	.03	**−.67**	**.60**	**−.71**	.11	.19	.11
11.	When my stomach is upset, I worry that I might be seriously ill.	.25	.12	.21	**−.50**	**.60**	**−.55**	−.23	−.29	.28
13.	Other people notice when I feel shaky.	.15	.25	.13	**−.49**	.30	**−.45**	.09	−.29	.16
14.	Unusual body sensations scare me.	.35	.37	.35	**−.44**	.25	**−.44**	−.02	−.17	−.02
1.	It is important for me not to appear nervous.	.01	−.05	.03	−.17	.07	−.19	**.73**	**.76**	**.70**
5.	It is important to me to stay in control of my emotions.	.13	.14	.12	.01	.09	.00	**.73**	**.73**	**.74**
7.	It embarrasses me when my stomach growls.	.26	**.40**	.26	−.25	.31	−.22	.11	.15	.08

Note. Salient factor loadings ≥ |.40| are listed in boldface type. Total = total sample, NCP = nonclinical panickers, NP = nonpanickers. Eigenvalues for the total sample = 5.39, 1.56, 1.27, 1.02, .89, .82, .72, .67, .61, .56, .51, .46, .45, .39, .35, .31. Eigenvalues for the nonclinical panickers = 4.32, 1.72, 1.53, 1.38, 1.19, .82, .78, .72, .67, .55, .53, .50, .44, .37, .27, .23. Eigenvalues for the nonpanickers = 5.38, 1.61, 1.31, 1.07, .90, .76, .71, .68, .59, .57, .52, .45, .41, .38, .35, .31.

Table II. Coefficients of Congruence Between Anxiety Sensitivity Index Factors from the Present Study and Factors from Previously Published Three-Factor Anxiety Sensitivity Index Solutions

	ASI factor from present study		
Study and ASI factor	Physical concerns	Cognitive concerns	Social concerns
Stewart physical	**.96**	−.26	.03
Stewart cognitive	.15	**.97**	.13
Stewart social	.12	−.04	**.96**
Stein physical	**.96**	−.20	−.13
Stein cognitive	.16	**.95**	.17
Stein social	.20	−.09	**.96**
Zinbarg physical	**.93**	−.26	−.12
Zinbarg cognitive	.06	**−.91**	.08
Zinbarg social	.32	−.30	**.86**
Taylor physical	**.23**	−.76	.11
Taylor cognitive	.59	**.15**	−.24
Taylor social	.67	−.39	**.56**

Note. Coefficients of congruence between corresponding factors from different studies appear in boldface type Stewart = Stewart et al. (1997), Stein = Stein et al. (1999), Zinbarg = Zinbarg et al. (1997), Taylor = Taylor et al. (1996).

obtained from the principal components analyses of the total sample, nonclinical panickers, and nonpanickers.[3]

Three ASI subscales were created with items assigned to subscales based on their highest salient factor loading in the total sample (Item number 7 was not included in the calculation of subscales because it did not load on any factor). The subscales assessed concerns about physiological anxiety sensations (the "Physical Concerns" subscale), cognitive incapacitation (the "Cognitive Concerns" subscale), and publicly observable anxiety reactions and loss emotional control (the "Social Concerns" subscale). Correlations between the subscales were .57 for the Physical Concerns and Cognitive Concerns subscales ($p < .01$), .24 for the Physical Concerns and Social Concerns subscales ($p < .01$), and .20 for the Cognitive Concerns and Social Concerns subscales ($p < .01$). Internal consistency coefficients for the Physical Concerns, Cognitive Concerns, and Social Concerns subscales were .83, .80, and .50, respectively. Although researchers have reported obtaining an ASI Social Concerns subscale and have shown it to possess discriminant validity (e.g., Zinbarg et al., 1997), the Social Concerns subscale in the present study contained only two items and had an unsatisfactory internal consistency coefficient. Because of its poor psychometric properties, this subscale was not used in comparisons between nonclinical panickers and nonpanickers.

[3]ASI item means and standard deviations for each sample are available from the authors upon request.

In order to examine the replicability of the ASI factor solution described previously, coefficients of congruence (Gorsuch, 1983) were computed to quantify the degree to which the present results converged with the results of previously published studies reporting three-factor ASI solutions. Table II provides coefficients of congruence between the ASI factors from the present study to those obtained by Stein et al. (1999), Stewart et al. (1997), Zinbarg et al. (1997), and Taylor et al. (1996). Factors were considered "corresponding" based on factor labels assigned by the authors. Congruence coefficients between corresponding factors from the present study and the investigations by Stein et al. (1999), Stewart et al. (1997), and Zinbarg et al. (1997) were very high (median = |.96|), whereas coefficients of congruence between noncorresponding factors were much lower (median = |.05|). The three-factor solution from the present study converged substantially less with the results reported by Taylor et al. (1996), as coefficients of congruence between corresponding factors ranged from .56 for the Social Concerns factor to .15 for the Cognitive Concerns factor.

ASI Scales and Nonclinical Panic

Independent-samples *t*-tests were used to examine mean differences between nonpanickers and nonclinical panickers in ASI total scores and ASI subscale scores. Nonclinical panickers scored significantly higher than did nonpanickers on ASI total scores, the Physical

Table III. Means, Standard Deviations, *t*-tests, and Effect Sizes for Differences Between Nonpanickers and Nonclinical Panickers in Anxiety Sensitivity Index Total Scores and Subscale Scores

	Nonpanickers ($n = 771$)		Nonclinical panickers ($n = 123$)				
ASI scale	*M*	*SD*	*M*	*SD*	*t*	*p*	*d*
ASI total score	17.8	9.6	24.2	9.5	−6.83	<.001	.65
ASI physical subscale	7.4	5.2	10.5	5.2	−6.10	<.001	.58
ASI cognitive subscale	4.3	4.4	7.1	4.5	−6.58	<.001	.63

Note. ASI = Anxiety Sensitivity Index.

Concerns subscale, and the Cognitive Concerns subscale (see Table III). Estimates of effect size, defined as the ratio of the difference between group means relative to the pooled standard deviation of both groups (Cohen, 1988), were also calculated for each ASI subscale. Based on Cohen's descriptions of a small effect size as approximately .20, a medium effect size as approximately .50, and a large effect size as approximately .80, the ASI total, Physical Concerns, and Cognitive Concerns scales all appear to have effect sizes within the medium range.

ASI Scales and Panic Expectedness

Differences between spontaneous panickers, situational panickers, and nonpanickers in ASI total scores and ASI subscale scores were examined using one-way analysis of variance (ANOVAs) and Tukey's HSD tests for post hoc comparisons. Both spontaneous and situational panickers scored significantly higher than did nonpanickers on ASI total scores, $F(847) = 25.11$, $p < .01$, the Physical Concerns subscale, $F(845) = 20.54$, $p < .01$, and the Cognitive Concerns subscale, $F(846) = 23.41$, $p < .01$. Spontaneous panickers and situational panickers did not differ on any of the ASI scales.

ASI Scales and Panic Frequency

Differences between frequent panickers, infrequent panickers, and nonpanickers in ASI total scores and ASI subscale scores were examined using one-way ANOVAs and post hoc Tukey's HSD tests. Frequent and infrequent panickers differed significantly from nonpanickers in ASI total scores, $F(891) = 24.56$, $p < .01$, and the Physical Concerns subscale $F(889) = 19.01$, $p < .01$. Differences between all three groups were evidenced on the Cognitive Concerns subscale, $F(890) = 24.89$, $p < .01$, with frequent panickers ($M = 8.24$, $SD = 4.47$) scoring higher than infrequent panickers ($M = 6.22$, $SD = 4.39$), who in turn scored higher than nonpanickers ($M = 4.29$, $SD = 4.42$).

DISCUSSION

The present study provides further evidence that AS consists of multiple dimensions. A principal components analysis performed on a sample of over 1,000 undergraduates provided support for a clearly interpretable three-factor solution for the ASI that assessed fears of physical, cognitive, and social anxiety reactions. Separate principal components analyses conducted with nonpanickers and nonclinical panickers yielded highly similar three-factor solutions. The factor-analytic results of the present study were highly consistent with the results of Stein et al. (1999), Stewart et al. (1997), and Zinbarg et al. (1997) as evidenced by strong coefficients of congruence between corresponding factors from these studies. Substantially lower convergence was found between the present study's ASI factor structure and the three-factor solution reported by Taylor et al. (1996). Thus, with the exception of Taylor et al. (1996), the factor-analytic results appeared to highly replicate previous findings.

Although the psychometric properties of the Physical and Cognitive Concerns subscales from the present study appeared satisfactory, the Social Concerns subscale did not appear to be adequately measured by the ASI. Other researchers have also noted problems with the ASI's assessment of the social domain of AS (e.g., Taylor, 1999). The ASI appears to be an inadequate tool for the assessment of a putative "social" dimension of AS.

Based on the relatively large body of research demonstrating that questionnaire assessment of NCP yields much higher average prevalence rates than do structured interview assessment, the present study sought to apply a conservative criterion to the definition of NCP to reduce the

number of false positives identified by the PAQ. The prevalence of NCP in this sample (11.5%) closely resembles the prevalence rates typically observed in structured interview assessments of NCP and is substantially lower than the prevalence rates that are usually obtained in studies using questionnaire assessment (Norton et al., 1992). The results of the present study support the idea that questionnaire assessment of NCP may be substantially improved by applying a conservative definition and providing participants with a description of panic attacks that enables them to differentiate panic from other forms of anxiety (Brown & Cash, 1989; Wilson, Sandler, Asmundson, Larson, & Ediger, 1991). It should be noted, however, that the design of the present study does not directly examine the validity of this assessment method.

Between-group comparisons performed in the present study indicated that AS and its dimensions were differentially related to characteristics of nonclinical panic attacks. Consistent with previous research (e.g., Brown & Cash, 1990), ASI total scores were shown to be significantly higher among nonclinical panickers than among nonpanickers. Follow-up analyses indicated that nonclinical panickers scored significantly higher than did nonpanickers on the Physical Concerns and Cognitive Concerns subscales. The experience of spontaneous panic attacks was not associated with elevated scores on any of the ASI variables. This observation is consistent with previous research indicating that few meaningful differences exist between situational and spontaneous nonclinical panickers (Cox, Endler, & Norton, 1994; Norton et al., 1986; Whittal, Suchday, & Goetsch, 1994; Wilson et al., 1991, 1992). In contrast to panic expectedness, several studies have supported panic attack frequency as a characteristic of a more serious form of NCP (Cox et al., 1994; Norton, Cairns, Wozney, & Malan, 1988; Telch, Lucas, & Nelson, 1989). In the present study, frequent panickers scored significantly higher than infrequent panickers on the ASI Cognitive Concerns subscale. This finding adds to the accumulated evidence indicating that frequent panic represents a more severe form of NCP and suggests that fears of cognitive dyscontrol are associated with panic attack frequency.

Nonclinical panickers have been viewed as existing on a panic–anxiety continuum between nonpanickers and individuals with panic disorder (Cox et al., 1991). If NCP is to be viewed as a subclinical form of panic disorder, it seems reasonable to expect nonclinical panickers to display the same pattern of ASI responses as clinical panickers do. In support of cognitive models of panic that highlight the importance of catastrophic misinterpretation of physical sensations (e.g., Clark, 1986), past research has shown that the ASI items that most strongly distinguish panic disorder from other anxiety disorders are those tapping fears of physical anxiety symptoms (Apfledorf, Shear, Leon, & Portera 1994; Taylor, Koch, & Crockett, 1991; Zinbarg et al., 1997). In contrast to the pattern of ASI responses typically obtained by clinical panickers, the nonclinical panickers in the present study differed from nonpanickers in near-equal measure on the Cognitive Concerns and Physical Concerns subscales, with the Cognitive Concerns subscale showing a slightly larger effect size.

A possible explanation for the present findings is that nonclinical panic attacks are triggered most often by psychological, not physiological, stressors, and therefore, fears of cognitive dyscontrol are more likely than are fears of physical sensations to contribute to the development of nonclinical panic attacks. This explanation would account for the differential ASI profile among clinical and nonclinical panickers suggested by the present results. The first component of this explanation, that nonclinical panickers tend to panic primarily in response to psychological stressors, has been demonstrated in a number of studies (e.g., Norton et al., 1986; Cox, Endler, Swinson, & Norton, 1992), which indicated that nonclinical panickers panic most often in social situations, during periods of high stress, and while taking tests and exams. Clinical panickers, in contrast, panic most often in classically agoraphobic situations (e.g., traveling alone) or out of the blue (Cox et al., 1992). The second part of the aforementioned explanation, the notion that fears of cognitive dyscontrol are most likely to contribute to nonclinical panic attacks, was supported in a prospective study by Schmidt et al. (1999). The authors found that only the ASI fear of cognitive dyscontrol factor predicted the development of panic attacks during a stressful 5-week training regimen after controlling for history of panic and trait anxiety. No other published investigation has examined the role of ASI dimensions in nonclinical panic. More direct tests of the predictive ability of ASI dimensions, such as anxiety-induction studies along the lines of Carter et al. (in press) and Schmidt (1999), are needed to illuminate the relationship between fears of different types of anxiety reactions and the development of nonclinical panic attacks. Nevertheless, based on the theory that panic attacks result from the interaction between specific triggers and fears of the sensations produced by the triggers (Cox, 1996), it is proposed that nonclinical panic may be most strongly associated with fears of cognitive dyscontrol because situations with high potential for creating cognitive dyscontrol (e.g., taking exams) are common panic attack triggers for nonclinical panickers.

Several limitations of the present study should be addressed. The present study's design did not permit examination of the extent to which AS may have been

contaminated by trait anxiety or some other general form of psychopathology. On the basis of past research findings suggesting that AS is in fact distinguishable from trait anxiety, it is assumed that the ASI assesses a specific form of anxiety psychopathology independent from trait anxiety; however, this assumption was not tested. A related limitation concerns the fact that participants were not assessed for the presence of mental disorders. Because it is likely that some participants would have met *DSM-IV* (1994) criteria for one or more diagnoses, the term "nonclinical" should be interpreted broadly. An additional limitation concerns the fact that all data gathered for this study were self-report and were thus susceptible to bias. It is possible that relationships between study variables may have been inflated as a result of questionnaire-specific method variance. Another limitation concerns the fact that questionnaire assessment of nonclinical panic, in comparison with structured interview assessment, may produce an undesirable number of participants falsely classified as nonclinical panickers (Brown & Deagle, 1992). This might have been a problem in particular for the item assessing spontaneous panic attacks, as previous research has shown this item to have questionable validity (Brown & Deagle, 1992; Margraf & Ehlers, 1988). The use of a college sample in the present study was another potential limitation. The generalizability of the current results to other populations is unknown. Finally, the present study used naturally occurring groups, and thus the independent variables could not be randomly assigned. Consequently, it is not clear whether the ASI differences between members of various groups in the study were attributable to elevated depression symptoms among nonclinical panickers, adherence to traditional gender roles, or other extraneous variables associated with group membership.

Overall, the present study provides further empirical support for multidimensionality of the AS construct and the idea that specific AS domains are related to panic attack symptomatology. The present study's results suggest two directions for future research. First, researchers might examine relationships between dimensions of AS and characteristics of panic attacks, including symptom severity, different types of symptoms, and attack frequency. Second, future research could address the issue of AS differences between nonclinical panickers and individuals with panic disorder. This line of research could be significantly facilitated with the use of expanded and improved measures of AS (e.g., Taylor & Cox, 1998) that might enable researchers to better measure specific AS dimensions. The knowledge gained from such research appears to have a significant potential for improving the prevention and treatment of panic states.

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