

## The Relation of Anxiety Sensitivity to Higher and Lower Order Personality Dimensions: Implications for the Etiology of Panic Attacks

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The relation of anxiety sensitivity (AS) to personality dimensions has received little attention. In this study, 4 AS indexes were administered along with measures of personality, fears, and panic attacks to 220 undergraduates. At the higher order level, AS was positively correlated with negative emotionality (NE) but was largely unrelated to either positive emotionality or constraint. At the lower order level, AS was positively correlated with absorption and NE indexes. Most of these correlations were significant even among participants with no panic attack history. AS exhibited incremental validity above and beyond a number of personality variables, including absorption and trait anxiety, in the prediction of fears and panic attack history. These findings are consistent with the hypothesis that a propensity toward immersion in sensory experiences is a diathesis for panic attacks.

The construct of anxiety sensitivity (AS) has occupied an important place in recent research on panic disorder (Lilienfeld, Turner, & Jacob, 1993). AS, as operationalized by the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986), reflects individual differences in the propensity to experience fear in response to one's own anxiety symptoms and has been posited as a risk factor for panic attacks and panic disorder (McNally, 1994). ASI scores have consistently been found to be elevated among panic disorder patients (e.g., Taylor, Koch, & Crockett, 1991). The construct of fear of fear, as assessed by the Agoraphobic Cognitions Questionnaire (ACQ) and the Body Sensations Questionnaire (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984), is closely related to AS but has usually been viewed as a consequence, rather than a cause, of panic: following panic attacks, patients are believed to become hypersensitive to their internal sensations (Goldstein & Chambless, 1978).

There is little information, however, regarding the relation of AS measures<sup>1</sup> to the personality domain. Such information is needed to understand how AS maps onto the factor space defined by higher and lower order personality dimensions and may provide clues to the etiology of AS and panic attacks. The ASI correlates moderately with trait anxiety measures (Lilienfeld, 1996), although it possesses incremental validity above and beyond these measures in the prediction of fears (Reiss et al., 1986) and response to hyperventilation (Rapee & Medoro,

1994). Arrindell (1993) factor analyzed the ACQ, BSQ, Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975), and several self-report anxiety and general psychopathology measures, and he found that the ACQ and BSQ loaded highly on a neuroticism dimension that appears similar to Tellegen's (1978/1982) Negative Emotionality (NE) factor (see Watson & Clark, 1984). Apart from these findings, little is known concerning the relation of AS to personality traits.

Lilienfeld et al. (1993) hypothesized that AS is related to the higher order personality dimension of constraint (CN), a trait associated with fearfulness and impulse control (Tellegen, 1978/1982) that appears related to Gray's (1982) behavioral inhibition system. Lilienfeld (1996) further suggested that AS is related to the lower order dimension of absorption (Tellegen & Atkinson, 1974), which reflects a propensity toward immersion in sensory and imaginative experiences. Absorption is generally assessed by the Multidimensional Personality Questionnaire (MPQ) Absorption Scale (Tellegen, 1978/1982), of which a typical item is "I can be deeply moved by a sunset." Although absorption has usually been viewed as facilitating pleasurable experiences, such as an enhanced appreciation of art and music (Wild, Kuiken, & Schopflocher, 1995), it may make individuals more attuned to potentially frightening sensations and heighten their risk for anxiety disorders characterized by a hypersensitivity to interoceptive cues. This possibility is consistent with factor analytic findings indicating that absorption exhibits moderate positive loadings on both positive emotionality (PE) and NE (Tellegen, 1978/1982).

The goals of this study are threefold. First, I examine the relations between AS and personality traits. AS was predicted to relate to the higher order dimensions of NE and CN and to the lower order dimensions of trait anxiety and absorption. Second, I

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<sup>1</sup> In the remainder of this article, the term "AS" subsumes both AS and fear of fear.

examine whether the relations between AS and personality traits differ for participants with versus without panic attacks. If a personality trait correlates with AS even among those with no history of panic, the possibility that this correlation is entirely a consequence of panic can be excluded. Third, I examine the incremental validity of AS indexes above and beyond personality traits for predicting anxiety symptoms.

These issues were examined in an undergraduate sample. Although undergraduate samples have low rates of panic disorder, their rates of panic attacks are relatively high (Norton, Cox, & Malan, 1992). The comparison of participants with versus without panic attacks should be informative regarding the consequences of these attacks on levels of AS and personality traits.

## Method

### Participants

Participants were 252 undergraduates (who received partial course credit), 7 of whom were excluded because of elevated scores on the MPQ Variable Response Inconsistency (VRIN; 27 and above) and True Response Inconsistency (TRIN; 41 and above) validity scales (see Measures section) and 25 of whom were excluded because of excessive missing data,<sup>2</sup> leaving 220 participants for the final analyses. Their mean age was 18.42 ( $SD = 1.24$ ); 118 were men, 110 were women, and 2 neglected to record their gender.

### Measures

Participants in large group settings were administered the following self-report measures in fixed order.

**ASI.** The ASI (Reiss et al., 1986) is a 16-item measure assessing the tendency to experience fear in response to one's own anxiety symptoms (e.g., rapid heart beat). The internal consistency (i.e., Cronbach's alpha) of the ASI was .75.

**Beliefs About Negative Consequences Inventory (BANCI).** The BANCI (Lilienfeld & Jones, 1992) consists of 12 items assessing the same content domains as the ASI (e.g., becoming short of breath). Respondents are asked to rate the probability that each anxiety symptom would result in harmful consequences for them. The internal consistency of the BANCI was .87.

**ACQ.** The ACQ (Chambless et al., 1984) consists of 14 items measuring the extent to which respondents experience thoughts that frequently occur during panic (e.g., "I will have a heart attack"). The internal consistency of the ACQ was .82.

**BSQ.** The BSQ (Chambless et al., 1984) consists of 17 items that assess the extent to which respondents experience fears of physical sensations that commonly occur during panic (e.g., dizziness). The internal consistency of the BSQ was .85.

**MPQ.** The MPQ (Tellegen, 1978/1982) is a 300-item, true-false questionnaire designed to measure the major dimensions of personality.<sup>3</sup> The MPQ lower order scales, which were developed by an iterative program of factor analysis, construct reformulation, and item revision, were designed to be internally consistent (the alphas for these scales in this sample ranged from .71 to .88) and relatively independent of one another. The MPQ scales have been found to exhibit good convergent and discriminant validity with peer ratings of personality (Tellegen & Waller, in press).

The MPQ consists of three higher-order factors: PE, NE, and CN. The "Big Three," rather than the "Big Five" (Church, 1994), were examined in this study because they bear more explicit relations to psychobiological dimensions, such as the behavioral inhibition system

posited by Gray (1982) to underlie anxiety. PE is a propensity to experience positive affects of many kinds (e.g., cheerfulness), whereas NE is a propensity to experience negative affects of many kinds (e.g., anxiety). As noted earlier, CN is a fearfulness and impulse-control dimension.

The MPQ also contains 11 lower order scales: The Wellbeing, Social Potency, Social Closeness, and Achievement Scales load primarily on PE; the Stress Reaction, Alienation, and Aggression Scales load primarily on NE; and the Harmavoidance, Control, and Traditionalism Scales load primarily on CN; the Absorption Scale does not load primarily on any one higher-order factor. Two of these scales are especially relevant to anxiety disorders. The Stress Reaction Scale, which assesses tenseness and irritability, is similar to standard measures of trait anxiety. The Harmavoidance Scale assesses a tendency to avoid dangerous experiences and is primarily a measure of fearfulness. Trait anxiety is a chronic susceptibility to experiencing stress, whereas fearfulness is a sensitivity to signals of danger (Tellegen & Waller, in press; Watson & Clark, 1984).

The MPQ contains several validity scales, two of which (VRIN and TRIN) were used to exclude questionable protocols. VRIN, which assesses random or careless responding, consists of item pairs in which the items are highly intercorrelated; respondents receive one point each time they give inconsistent responses to the items within each pair. TRIN, which assesses acquiescence, consists of item pairs in which the items are highly negatively correlated; respondents receive one point each time they respond in the same direction to both items (Tellegen, 1978/1982).

**Panic Attack Questionnaire (PAQ).** The PAQ version used in this study is a revision of the original PAQ (Norton, Dorward, & Cox, 1986) modified to assess the third edition, revised *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R*; American Psychiatric Association, 1987) criteria for panic disorder (Walker, Norton, & Ross, 1991). Because *DSM-IV* (American Psychiatric Association, 1994) criteria for panic attacks are identical to those of the *DSM-III-R*, the results reported here for panic attacks are applicable to both diagnostic systems. Margraf and Ehlers (1988) found that high PAQ scorers exhibited higher levels of AS, somatic symptoms, and anxiety than low PAQ scorers.

Panic symptoms were coded positive if respondents endorsed a score of 2 or more on a 0-4 scale. The attacks of nonclinical panickers who obtain moderate ratings on panic symptom scales are comparable in severity to those of panic disorder patients (Asmundson, Norton, Lanthier, & Cox, 1996). Because the base rate of panic disorder in this study was low (see the Results section), only panic attacks were examined in analyses. Because the PAQ only assesses *DSM-III-R* criteria for panic attacks among respondents who have reported such attacks in the past year, the presence versus absence of panic during the past year only was used in primary analyses. Among those who have experienced panic in the past year, the PAQ assesses whether they have ever experienced an unexpected panic attack. Finally, the PAQ assesses whether participants have experienced panic attacks prior to the past year, although it does not assess whether these attacks meet *DSM-III-R* criteria.

<sup>2</sup> These participants were excluded because of excessive missing data (i.e., three or more omitted items) on VRIN, TRIN, or both, which made it impossible to evaluate the validity of their MPQs. On *t* tests, it was revealed that these 25 participants did not differ significantly from other participants on age or scores on the ASI, BANCI, ACQ, BSQ, STAI-T, or FQ (see Measures section), and chi-square analyses revealed that they did not differ significantly from other participants on gender, history of panic in the past year, or history of unexpected panic.

<sup>3</sup> Although the prepublication version of the MPQ was used in this study, the published version is, except for the loss of 10 items, virtually identical to the prepublication version (B. Kaemmer, personal communication, July 11, 1996).

**Fear Questionnaire (FQ).** The FQ (Marks & Mathews, 1979) contains 17 items assessing common fears (e.g., injections) and was administered in view of research (e.g., Reiss et al., 1986) indicating that AS is associated with fears of specific objects and situations. The FQ contains three subscales, but in this study they exhibited very similar factor loadings and correlations with other variables. Therefore, only the total FQ score was used. FQ total scores distinguish patients with agoraphobia (who tend to have multiple fears) from those with specific and social phobias, and they predict treatment response among the former patients (Marks & Mathews, 1979). The internal consistency of the FQ was .89.

**State-Trait Anxiety Inventory, Trait Form (STAI-T).** The STAI-T (Spielberger, Gorsuch, & Lushene, 1970) contains 20 items that assess enduring symptoms of anxiety. The STAI-T correlates highly with other self-report indexes of NE (Watson & Clark, 1984) and differentiates anxiety disordered patients from "normal" individuals (Taylor et al., 1991). The internal consistency of the STAI-T was .91.

## Results

### Prevalence of Panic Disorder and Panic Attacks

Only 4 participants (2%) met *DSM-III-R* criteria for panic disorder. Sixty (27%) participants reported at least one *DSM-III-R* panic attack during the past year; of these 60, 27 (12% of the total sample) reported at least one unexpected panic attack.

### Correlations Among AS Measures

The correlations among the four AS indexes were moderately high and significant (*r*s ranged from .50 to .63, all *p*s < .001).

### Factor Analyses

The AS, personality, and fear measures were submitted to a principal-axis factor analysis using orthogonal (i.e., varimax) rotation. An oblique (i.e., oblimin) rotation produced results very similar to those reported here. Because the MPQ consists of three higher order factors, three factors were extracted. In addition, although the scree plot was consistent with either a 3- or 4-factor solution, only the former was clearly interpretable. The eigenvalues of the first three components, which accounted for 50% of the total variance, were 4.14, 2.52, and 1.83, respectively (the eigenvalue of the fourth component was 1.23). The rotated three-factor solution is displayed in Table 1.

Stress reaction, absorption, and alienation exhibited salient (.30 or greater) loadings on the first factor, which appears to represent an NE dimension. The loading of aggression on this factor, however, was weak. All AS indexes loaded highly on this factor, as did the STAI-T and FQ. Wellbeing, achievement, social potency, social closeness, control, and traditionalism exhibited high loadings on the second factor, which appears to represent a PE dimension. Both trait anxiety indexes (i.e., stress reaction and the STAI-T) and alienation had salient negative loadings on this factor, whereas the loadings of AS indexes were negligible. Control and harmavoidance exhibited high loadings on the third factor, which was bipolar and appears to be a CN dimension. The loading of traditionalism on this factor, however, was modest. Social potency, alienation, and aggression exhibited salient negative loadings on this factor, and the loadings of AS indexes were again negligible.

Table 1  
Results of Rotated Three-Factor Solution

Variable	Factor 1	Factor 2	Factor 3
ASI	<b>.78</b>	.14	.06
BANCI	<b>.67</b>	-.02	-.05
ACQ	<b>.65</b>	-.09	-.07
BSQ	<b>.73</b>	.07	-.05
Stress reaction	<b>.62</b>	<b>-.32</b>	.10
STAI-T	<b>.60</b>	<b>-.49</b>	.02
FQ	<b>.53</b>	.00	.03
Absorption	.31	.27	-.23
Wellbeing	-.26	<b>.78</b>	-.02
Achievement	.05	<b>.55</b>	.08
Social potency	.01	<b>.44</b>	<b>-.31</b>
Social closeness	-.13	<b>.38</b>	.20
Alienation	<b>.36</b>	<b>-.30</b>	<b>-.38</b>
Aggression	.11	-.07	<b>-.56</b>
Control	.09	<b>.39</b>	<b>.45</b>
Harmavoidance	.11	-.01	<b>.57</b>
Traditionalism	.10	<b>.36</b>	.22

Note. *n*s range from 206 to 220. Salient (i.e., .30 or higher) factor loadings appear in boldface. ASI = Anxiety Sensitivity Index; BANCI = Beliefs About Negative Consequences Inventory; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Body Sensations Questionnaire; STAI-T = State-Trait Anxiety Inventory, Trait Form; FQ = Fear Questionnaire.

### Correlations Between AS and Measures of Personality and Fears

Because the correlations among the AS measures were moderately high and their loadings on the NE factor were virtually identical, a composite AS index was created by summing the standardized (*z*) scores of all four AS measures. This index was used in all subsequent analyses.

The correlations between the AS composite index and measures of personality and anxiety are displayed in Table 2. The AS composite index was significantly (positively) correlated with NE, but not with either PE or CN. In addition, the AS composite index was significantly positively correlated with stress reaction, alienation, absorption, the STAI-T, FQ, and panic attack history within the past year, and it was significantly negatively correlated with well-being and social closeness.

### Correlations Among Participants With Versus Without Panic Attacks

The next set of analyses examined whether the personality correlates of AS identified in the previous analysis (viz., NE, trait anxiety, absorption, alienation, well-being, and social closeness), differed among participants with versus without panic attacks. The correlations between the AS composite index and these variables among participants with versus without a history of panic in the past year are shown in Table 3.

Tests of the difference between independent correlations revealed that no correlations differed significantly between the two groups. The AS composite variable correlated positively and in most cases significantly with NE, stress reaction, absorption, alienation, and the STAI-T in both groups. Well-being was significantly (and negatively) correlated only among participants

Table 2  
Correlations Between AS Composite Index and Personality and Anxiety Measures

Variable	AS composite index
MPQ scales	
Higher order dimensions	
Positive emotionality	-.01
Negative emotionality	.40***
Constraint	.12
Lower order dimensions	
Wellbeing	-.20**
Achievement	.03
Social potency	-.01
Social closeness	-.16*
Stress reaction	.46***
Alienation	.26***
Aggression	.07
Control	.04
Harmavoidance	.06
Traditionalism	.04
Absorption	.27***
STAI-T	.47***
FQ	.42***
Panic history in past year	.30***
History of unexpected panic	.07

Note. *ns* range from 206 to 220. AS = anxiety sensitivity; MPQ = Multidimensional Personality Questionnaire; STAI-T = State-Trait Anxiety Inventory, Trait Form; FQ = Fear Questionnaire.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ , all two-tailed.

with no panic attack history, whereas the correlations with social closeness were nonsignificant in both groups. A more conservative analysis examining correlations between the AS composite index and personality variables among participants who neither experienced panic attacks in the past year nor prior to the past year ( $n = 118$ ) yielded similar results, except that the correlations with alienation and well-being were no longer significant.

#### Correlates of Panic Attack History

NE ( $r = .18, p < .01$ ), stress reaction ( $r = .17, p < .05$ ), alienation ( $r = .18, p < .05$ ), traditionalism ( $r = -.14, p <$

Table 3  
Correlations Between AS Composite Index and Selected Personality Measures for Participants With Versus Without a History of Panic Attacks in the Past Year

Variable	Panic attack history in past year ( $n = 60$ )	No panic attack history in past year ( $n = 160$ )
MPQ variables		
NE	.35**	.37***
Stress reaction	.36**	.46***
Absorption	.28*	.23**
Alienation	.20	.24**
Wellbeing	-.20	-.18*
Social closeness	-.20	-.12
STAI-T	.29*	.48***

Note. AS = anxiety sensitivity; MPQ = Multidimensional Personality Questionnaire; NE = negative emotionality; STAI-T = State-Trait Anxiety Inventory, Trait Form.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ , all two-tailed.

.05), absorption ( $r = .16, p < .05$ ), and the STAI-T ( $r = .27, p < .001$ ) were significantly correlated with panic attack history in the past year, but the FQ ( $r = .03$ ) was not. None of the MPQ variables was significantly correlated with unexpected panic attack history. The STAI-T was significantly correlated ( $r = .29, p < .05$ ) with unexpected panic attack history, but the FQ was not ( $r = .10$ ).

#### Incremental Validity Analyses

In the final analyses, I examined the extent to which the AS composite index contributed to the prediction of anxiety symptoms above and beyond the personality correlates of AS identified earlier. In the first set of analyses, the FQ was used as the dependent variable. Hierarchical multiple regressions were conducted in which each personality measure was entered first, followed by the AS composite index. In the second set of analyses, the presence versus absence of panic attacks in the past year was the dependent variable. These analyses used logistic regressions but were otherwise performed in the same fashion as those for the FQ.

As can be seen in Table 4, the AS composite index exhibited significant increments in variance (i.e.,  $R^2$  changes) above and beyond all of the personality correlates of AS for predicting FQ scores. The AS composite index also exhibited significant incremental validity above and beyond all of these personality correlates for predicting panic history within the past year. Finally, the AS composite index exhibited incremental validity for predicting FQ scores and panic history within the past year even after all MPQ lower order scales and the STAI-T were entered.

#### Discussion

The findings reported here indicate that AS indexes are markers of NE, although these indexes possess incremental validity

Table 4  
Incremental Validity of AS Composite Index Relative to Selected Personality Measures for Predicting Fears and Panic Attacks

Variable	FQ total score		Panic attack history in past year <sup>a</sup>
	$R^2$ change	<i>df</i> s	
MPQ			
NE	.10***	(2, 208)	16.18***
Stress reaction	.08***	(2, 216)	15.16***
Absorption	.14***	(2, 214)	18.09***
Alienation	.14***	(2, 214)	18.34***
Wellbeing	.16***	(2, 216)	13.57***
Social closeness	.18***	(2, 216)	15.44***
STAI-T	.08***	(2, 203)	6.25*
All MPQ lower order scales and the STAI-T	.06***	(13, 185)	11.44***

Note. For panic attack history in past year,  $df = 1$  for all comparisons. AS = anxiety sensitivity; FQ = Fear Questionnaire; MPQ = Multidimensional Personality Questionnaire; NE = negative emotionality; STAI-T = State-Trait Anxiety Inventory, Trait Form.

<sup>a</sup> Chi-square improvement.  
\*  $p < .05$ . \*\*\*  $p < .001$ .

above and beyond NE. Contrary to prediction, CN was not significantly correlated with either the AS composite index or with panic attack history, suggesting that a hypersensitivity to signals of danger may bear little relation to panic attack risk. AS was correlated significantly, although modestly, with absorption, perhaps reflecting a propensity toward immersion in sensory and imaginative experiences assessed by both measures. Moreover, this correlation was significant even among those with no history of panic attacks. Although this finding suggests that absorption may be a diathesis for panic, longitudinal studies will be needed to subject this possibility to a more direct test.

The present results suggest several avenues for further investigation. First, it will be necessary to determine the extent to which these findings generalize to clinical samples, particularly because nonclinical panickers typically report more cognitive symptoms (e.g., fears of dying) during attacks than panic disorder patients (Norton et al., 1992).

Second, because heightened self-focused attention is a correlate of many conditions (Ingram, 1990), the specificity of these findings to panic attacks and panic disorder remains to be determined. Although absorption correlated nonsignificantly ( $r = .13$ ) with a history of unexpected panic attacks, which is a hallmark of panic disorder, subsidiary analyses revealed that among those with unexpected panic, absorption correlated significantly ( $r = .48, p < .05$ ) with the proportion of unexpected attacks. These results offer mixed support for the specificity of absorption to unexpected panic and thus for panic disorder.

Third, it will be important to examine the relations between absorption and AS, on the one hand, and hypochondriasis, on the other. Hypochondriasis, like panic disorder, is associated with a tendency to catastrophically misinterpret physical symptoms (McNally, 1994). Although Otto, Pollack, Sachs, and Rosenbaum (1992) found that the ASI correlated positively with the number of hypochondriacal concerns among panic disorder patients, the relation of AS to hypochondriasis per se has yet to be examined.

Fourth, it will be of interest to examine the relation between absorption and AS, on the one hand, and relaxation-induced panic, on the other. Many panic disorder patients experience attacks during relaxation, perhaps because relaxation produces heightened attention to subtle bodily sensations (Barlow, 1988). Individuals with high levels of absorption and AS may be especially susceptible to such attacks.

Fifth, it will be necessary to examine the relations between AS and other taxonomies of personality, such as the Big Five. Because absorption is moderately correlated with openness to experience (Church, 1994), one might predict that AS would relate to this Big Five dimension. In addition, because NE is closely related to neuroticism (Watson & Clark, 1984), AS might be expected to relate to this Big Five dimension as well. Examination of the relations of AS to alternative taxonomies of personality should clarify the nature of AS and provide further clues to the dispositional underpinnings of panic attacks.

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First review of nominations will begin December 8, 1997.