



Avoidance behavior in panic disorder: The moderating influence of perceived control [☆]

Kamila S. White^{a,*}, Timothy A. Brown^b, Tamara J. Somers^c, David H. Barlow^b

^a*Department of Psychology, University of Missouri-Saint Louis, One University Boulevard, 212 Stadler Hall, St. Louis, MO 63121, USA*

^b*Boston University, USA*

^c*University of Pittsburgh, USA*

Received 30 August 2004; received in revised form 22 March 2005; accepted 11 July 2005

Abstract

The relations among anxiety sensitivity, perceived control, and agoraphobia were examined in 239 patients diagnosed with panic disorder (PD). Most patients exhibited agoraphobia accompanying their PD (98% situational avoidance; 90% experiential avoidance; and 80% endorsed interoceptive fear and avoidance). Anxiety sensitivity and perceived emotional control were associated with agoraphobia, and perceived threat control was found to moderate the relationship between anxiety sensitivity and agoraphobia. Lower levels of perceived control were associated with a stronger relationship between anxiety sensitivity and agoraphobia. Results were consistent for self-reported and clinician-rated agoraphobia. Implications for the role of perceived control in agoraphobia development and treatment are discussed.

© 2005 Elsevier Ltd. All rights reserved.

Keywords: Agoraphobia; Perceived control; Anxiety sensitivity; Panic disorder

Introduction

Agoraphobia is a separate but common complication of panic disorder (PD). Agoraphobia generally refers to an individual's avoidance or endurance with distress of situations that are difficult to escape in the event of a panic attack. The diagnosis of agoraphobia does not require avoidance to be an essential feature (American Psychiatric Association, 1994), but can be made from any one of three criteria: (1) avoidance behavior, (2) experiencing and enduring anxiety or distress in the phobic situation, or (3) requiring a companion for exposure to the phobic situation. It is conceivable that an individual could have no or few avoidance behaviors but may have considerable fear, anxiety, and distress in situations. In short, the anxiety associated with agoraphobia is aimed at the onset of distressing symptoms in situations, not the situation itself. Because of this

[☆]Preparation of this article was partially supported by Grants MH63185 (awarded to Dr. White) and MH39096 (awarded to Dr. Brown) from the National Institute of Mental Health. We are grateful to Ms. Nicole Claudia for her assistance with this study. We are also grateful to the patients and clinicians who participated in this study.

*Corresponding author.

E-mail address: whiteks@umsl.edu (K.S. White).

“fear of fear” (Goldstein & Chambless, 1978), a continuum of restrictions may develop that range from subtle to more obvious avoidance.

Avoidance tactics often arise in PD because individuals believe these will “protect” them in the event of a panic attack (White & Barlow, 2002). These strategies may include situational, interoceptive, and experiential avoidance. The most obvious behavioral marker of avoidance is situational avoidance, which entails refusal of entering phobic locations (e.g., driving, theaters). This type of avoidance is commonly regarded as the most palpable and impairing aspect of PD. Less understood and less overt forms of avoidance are interoceptive and experiential avoidance. *Interoceptive avoidance* involves refusal of substances (e.g., caffeine) or activities (e.g., exercise) that produce sensations that resemble the symptoms of panic, and *experiential avoidance* involves withdrawing from and minimizing contact with the phobic stimulus through the use of avoidance tactics including use of safety signals (e.g., cell phones, bottled water) or use of thought strategies (e.g., distraction, counting, reading). Research has consistently demonstrated an attentional bias for threat information in anxious individuals (Broadbent & Broadbent, 1988), and experiential avoidance encompasses an effortful attempt to minimize attention to and contact with a feared stimulus to avert panic or other associated negative consequences (i.e., embarrassment, humiliation). Experiential avoidance is thought to occur when an individual is “unwilling to remain in contact” with certain experiences, including emotions, bodily sensations, and thoughts (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). In application to PD, an anxious individual may exhibit no or few overt, situational avoidance behaviors (e.g., they may be willing to cross a bridge) but may be engaging in considerable subtle interoceptive avoidance (e.g., walking at a slow pace) or experiential avoidance (e.g., listening to music or counting footsteps) that serve to lessen contact with the phobic stimulus. In sum, avoidance behaviors range from overt to more subtle efforts to evade or lessen contact with the phobic stimulus and serve to help the individual feel more secure or less anxious in the event of a panic attack.

Improving the understanding of agoraphobia and the factors that contribute to phobic avoidance has far-reaching implications for individuals with PD. It is well documented that degree of situational avoidance is associated with a more severe syndrome of PD (Buller, Maier, & Benkert, 1986). Prospective studies have consistently demonstrated that agoraphobia has a negative impact on the course of PD including reduced remission rates (Keller et al., 1994), higher role impairment (Magee et al., 1996), higher disability (Buller, Maier, Goldenberg, & Lavori, 1991), and poorer long-term impairment in general (Faravelli & Albanesi, 1987). Agoraphobia is also associated with a less favorable response to treatment (Ehlers, 1995) and increased relapse following treatment (Katschnig & Amering, 1998). Moreover, agoraphobia is related to maintenance of PD in treated samples, recurrence of panic attacks in remitted patients, and continuance of spontaneous attacks in infrequent panic (Ehlers, 1995). Collectively, these studies and many others highlight the wide-ranging negative impact of phobic avoidance on PD.

Contemporary theories of agoraphobia have stemmed from comprehensive models of PD (Barlow, 2002; Beck, 1988; Clark & Ehlers, 1993). Barlow’s model of PD posits that some individuals possess biological and psychological vulnerabilities to develop panic attacks in the absence of a real threat (“false alarms”; White & Barlow, 2002). These false alarms (or panic attacks) occur as a function of stressful life events and are facilitated by negative affect. Through classical conditioning, interoceptive cues may become associated with the initial panic attack and result in subsequent panic attacks (“learned alarms”), and PD is thought to be the result of contiguous stimuli being conditioned to elicit the anxiety (Wolpe & Rowan, 1988). It is this association of an initial false alarm with interoceptive or somatic cues that may be particularly crucial in the development of agoraphobia. At this point, some individuals experience a panic attack, and subsequently become anxious in anticipation of having another attack. The vulnerability for developing anxious apprehension may lay dormant unless activated by certain psychological vulnerabilities and experiences. One *generalized psychological vulnerability* factor consists of the perception that emotions and situations in general are uncontrollable and unpredictable (i.e., a lack of perceived control). As a result of the false alarm and the individual’s low perceptions of control, they may begin to experience anxious apprehension about having future panic attacks. Individuals without this vulnerability would not experience anxiety focused on the next panic attack (i.e., considered a non-clinical panic attack). Indeed, experimental studies in non-clinical samples have shown that perceived control may buffer the panicogenic response to biological challenge (Zvolensky, Eifert, & Lejuez, 2001). Consequently, phobic avoidance behaviors in anxious individuals are thought to be

strategies employed by the individual to manage the unexpected panic and may be partly a function of anxiety sensitivity and perceptions of control (White & Barlow, 2002).

Anxiety sensitivity may precipitate phobic avoidance in PD. Anxiety sensitivity is an enduring, trait-like tendency to believe anxiety and its symptoms are harmful to the body or mental state, and this tendency can be considered as a specific psychological vulnerability factor for PD. This belief may extend beyond the immediate discomfort of the panic attack itself. Research has established that presence of anxiety sensitivity increases the likelihood of developing an anxiety disorder in general and PD in particular (Schmidt, Lerew, & Jackson, 1999; Taylor & Fedoroff, 1999). Accumulating evidence shows that reductions in anxiety sensitivity correspond to decreases in PD symptoms (Telch et al., 1993) and decreases in fearful responses to biological challenges (Schmidt, Trakowski, & Staab, 1997). Originally the construct of anxiety sensitivity was thought to be unidimensional, but more recent studies have indicated a multi-factorial structure, with the dimension reflecting “fear of physical sensations” as most predictive of panic (Zinbarg, Brown, Barlow, & Rapee, 2001). Anxiety sensitivity is an established risk factor for PD, and it may have a direct influence on the development of agoraphobia as well.

Whether the anxiety symptoms are perceived as controllable (or manageable) may influence the potency of panic attack fears and the extent of subsequent agoraphobic avoidance. Perceptions of diminished control over aversive events are considered vital to the etiology and maintenance of PD (Barlow, 2002). Laboratory studies show that individuals with PD report less fear and fewer panic attacks during laboratory panic provocations when they perceive the procedures as controllable (Rapee, Mattick, & Murrell, 1986; Sanderson, Rapee, & Barlow, 1989). These studies highlight the immediate connection between perceived control and the experience of panic; however, very few studies have explored the role of perceived control in the development of the distressing behavioral avoidance often accompanying PD. One particularly revealing study conducted by Craske, Miller, Rotunda, and Barlow (1990) underscores the importance of examining perceived control in agoraphobia. These researchers showed that initial panic attacks that occurred in difficult-to-escape or uncontrollable situations (e.g., driving on a highway, flying, being in a formal meeting) were associated with *more anxiety* than panic attacks that occurred in more escapable or controllable conditions (e.g., being at home alone, being with a significant other). Understanding the role of perceived control in agoraphobia may provide valuable insight into this most distressing complication of PD.

The present study examines the relationship between anxiety sensitivity and agoraphobia and the extent to which perceived control may moderate this relationship. Despite considerable research documenting the deleterious effects of agoraphobia on PD, surprisingly few published studies have been devoted to improving the understanding of the development and maintenance of agoraphobia in PD. Prevalence, clinical characteristics, and correlates of agoraphobia are described first. Anchored in contemporary conceptualizations of PD (White & Barlow, 2002), the directional relationships between anxiety sensitivity, perceived emotional control, and agoraphobia are examined. Multiple aspects of perceived control were investigated including perceptions of emotional control and of control over threatening events. Consistent with theory, it was speculated that anxiety sensitivity would be positively associated with agoraphobia, and that this relationship would be moderated by perceptions of control. In other words, the vulnerability factor of perceived control was hypothesized to influence the strength of the anxiety sensitivity–agoraphobia relationship. Because both higher anxiety sensitivity and lower perceived control were expected to be associated with increased avoidance, it was expected that anxiety sensitivity would be most strongly related to avoidance when perceived control was low.

Method

Participants

Data were collected as part of a larger study of the classification of anxiety and mood disorders within the Center for Anxiety and Related Disorders at Boston University. Participants were 239 consecutive outpatients (159 females, 80 males) with a principal diagnosis of PD with or without agoraphobia who were seeking psychological evaluation and treatment. Potential participants were excluded if they met current or recent (within the last 6 months) criteria for alcohol or substance abuse, current suicidality or homicidality,

psychosis, or organic brain syndrome. The large majority of patients were assigned *DSM-IV* principal diagnoses of PD with agoraphobia (PDA, $n = 229$, 95%), and the remaining patients were assigned diagnoses of PD without agoraphobia (PD, $n = 8$, 3.3%) and agoraphobia without a history of PD ($n = 3$, 1.3%). Diagnoses were established using the Anxiety Disorders Interview Schedule for *DSM-IV*: Lifetime version (ADIS-IV-L; Di Nardo, Brown, & Barlow, 1994).

Patients were referred from various media including local and national television programs (28%), medical health professionals (22%), mental health professionals (7%), friends/co-workers (21%), Internet websites (17%), or other (5%). Women constituted the large majority (66%), and the average age of the sample was 34.8 years ($SD = 10.6$, range = 18–66). The sample was predominantly Caucasian (90%); the remainder self-identified as African-American (4%), Hispanic/Latino (2%), Asian-American (1%), or other (3%). Forty-five percent of the sample reported their marital status as single, 39% married, 7% cohabitating, and 9% divorced, separated, or widowed. Employment status was identified as full-time position (70%), unemployed (11%), full-time student (8%), part-time position (6%), full-time homemaker (3%), retired (1%), and unemployed disability (1%). Thirty-seven percent of the sample had one or more children. The average household income level was in the \$20,001–50,000 range (33%). Nearly all had a high school diploma or equivalent degree (97%), and 59% had a bachelor's or other advanced degree.

Measures

Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (ADIS-IV-L; Di Nardo et al., 1994)

The ADIS-IV-L is a structured interview designed to comprehensively evaluate current and lifetime *DSM-IV* mood, anxiety, and substance use disorders as well as selected somatoform disorders. For each diagnosis, interviewers assign a 0–8 clinical severity rating (CSR) that indicates the degree of distress and impairment associated with the disorder (0 = “none” to 8 = “very severely disturbing/disabling”). In patients with two or more current diagnoses, the “principal” diagnosis is the one receiving the highest CSR. For current and lifetime disorders that meet or surpass the threshold for a formal *DSM-IV* diagnosis, CSRs of 4 (“definitely disturbing/disabling”) or higher are assigned as “clinical” diagnoses. In addition to the diagnostic information, this instrument contains a 22-item agoraphobia scale in which clinicians assess and rate the patient's avoidance of commonly avoided situations (e.g., public transportation, theaters) on a 0 (no avoidance/apprehension) to 8 (very severe avoidance/apprehension) scale. The diagnostic reliability of the ADIS-IV-L for principal *DSM-IV* anxiety and mood disorders is good to excellent in rater agreement ($\kappa = .77$ for PDA principal diagnosis; Brown, Di Nardo, Lehman, & Campbell, 2001), and the agoraphobia rating score has shown to be unidimensional and associated with excellent inter-rater reliability (.86, Brown et al., 2001).

Self-report questionnaires

Albany Panic and Phobia Questionnaire-Revised (APPQ-R; Brown, White, & Barlow, 2005)

The APPQ-R is a 24-item questionnaire measuring situational, interoceptive, and social fear and avoidance. This scale is a modification of the original scale by Rapee, Craske, and Barlow (1994/1995). Patients rate how much fear they would expect to experience in certain activities and situations in the next week on a 0 (no fear) to 8 (extreme fear) Likert scale. The Agoraphobia scale (APPQ-A), composed of 9 items reflecting common phobic situations (e.g., driving long distance, theaters), and the Interoceptive scale (APPQ-I), composed of five items measuring fear of activities that cause physical sensations (e.g., hiking on a hot day, exercising vigorously alone) were examined in this study. Evidence from clinical samples supports the reliability, factor structure, factor determinacy, and convergent and discriminant validity of the APPQ-R (Brown et al., 2005).

Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992)

The construct of anxiety sensitivity is defined as a fear of anxiety and anxiety-related sensations. Anxiety sensitivity is considered an individual difference variable reflecting the belief that the experience of anxiety causes illness, embarrassment, or additional anxiety. The ASI is a 16-item scale in which patients rate each item on a 0 (very little) to 4 (very much) scale. A total sum score is computed ranging from 0 to 64. The ASI

has adequate test/retest reliability ($r = .75$), a high intercorrelation among scale items, and criterion validity (Maller & Reiss, 1992). Consensus on the structure of the ASI is best regarded as a hierarchical factor structure with three first-order factors (i.e., physical concerns, mental incapacitation, and social concerns), and a single, higher-order factor (Zinbarg et al., 1997). In this study, we constrained our analyses to the Physical Concerns subscale because of its demonstrated utility in predicting panic attacks specifically and its theoretical relevance to PD in general (e.g., Zinbarg et al., 2001).

Anxiety Control Questionnaire-Revised (ACQ-R; Brown, White, Forsyth, & Barlow, 2004)

The ACQ-R is a 15-item questionnaire measuring perceived emotional control. The original scale by Rapee et al. (1996) was comprised of 30 items rated on a 6-point scale from 0 (strongly disagree) to 5 (strongly agree); a total score was summed with higher scores indicating greater perceived control. Although the use of the Total scale as a single measure has been recommended (Rapee et al., 1996), a recent psychometric re-evaluation has established a three-factor solution comprised of 15-items representing Threat Control (6 items), Emotional Control (5 items), and Stress Control (4 items). Brown et al. (2004) found support for a higher-order factor of perceived control, and each of the lower-order dimensions accounted for unique variance in autonomic anxiety and depression. The scale was found to be gender invariant and was form and parameter equivalent in clinical versus non-clinical samples. The subscales representing Threat Control and Emotional Control have been found to be uniquely related to autonomic anxiety (Brown et al., 2004), are theoretically and practically relevant to the expression of PD, and were both examined in this study.

Procedure

All potential patients completed a brief telephone interview to determine their eligibility for assessment. Eligible patients completed an intake assessment that included a thorough structured interview and a questionnaire battery. Clinicians trained and certified on the ADIS-IV-L completed structured interviews. All clinicians were either licensed psychologists, post-doctoral fellows, or doctoral level clinical psychology graduate students.

Results

Descriptive statistics

Patients in this study had experienced PD for an average of 6.8 years, and the vast majority (92%) had experienced an unexpected panic attack in the recent month. Most experienced an average of 5.9 full-blown panic attacks (i.e., 4 or more symptoms with abrupt onset) per month and an additional 13.6 limited symptom attacks (i.e., less than four symptoms) per month. The majority (63.6%) of patients reported a history of psychotropic medication use.

The means, standard deviations, ranges, and correlations for all study variables for all patients diagnosed with PD are reported in Table 1. For descriptive purposes, only patients with a current diagnosis of PD were included in this analyses. Overall, the scales representing perceived control, anxiety sensitivity, and agoraphobia were all correlated (ranging from .13 to .68, $p < .05$) with one exception; perceived threat control was not correlated with the Interoceptive scale of the APPQ-R. Self-reported and clinician-rated phobic avoidance were strongly correlated (.69 ($p < .01$)). Gender differences were evident on clinician-rated and self-reported phobic avoidance, perceived emotional control, and anxiety sensitivity-physical concerns. In all instances, women reported significantly greater fear, anxiety, and avoidance than men, all F 's were > 4.17 , p 's $< .05$.

Hierarchical regression analyses

Hierarchical regression analyses were conducted to examine the relationship between anxiety sensitivity and agoraphobia, and the moderating effect of perceived control on this relationship. Patients were included in the regression analyses if they received a current diagnosis of PD with agoraphobia. Separate analyses were

Table 1

Means, Standard deviations, range, and zero-order correlations for variables for women (above the diagonal, $N = 156$) and men (below the diagonal, $N = 80$) diagnosed with panic disorder

Variable	1.	2.	3.	4.	5.	6.	<i>M</i>	SD	Range	<i>F</i>
1. Phobic avoidance (ADIS-IV-L)	—	.71**	.42**	-.15	-.34**	.36**	19.10	15.71	0–68	7.02**
2. Agoraphobic fear (APPQ-A)	.57**	—	.46**	-.26**	-.40**	.31**	25.96	14.11	0–62	14.55*
3. Interoceptive fear (APPQ-I)	.26*	.39**	—	-.09	-.11	.34**	9.87	9.99	0–38	1.32
4. Perceived control—emotion (ACQ-E)	-.04	-.15	-.17	—	.32**	-.18*	5.65	4.29	0–18	4.45*
5. Perceived control—threat (ACQ-T)	-.07	-.08	-.10	.28*	—	-.28**	15.74	5.67	0–30	.76
6. Anxiety sensitivity—physical (ASI-P)	.15	.25*	.38**	-.26**	-.03	—	12.35	4.94	2–24	4.17*
Mean (<i>M</i>)	13.79	18.91	8.35	6.89	16.39	10.94				
standard deviation (SD)	12.03	12.02	8.84	4.31	4.72	5.05				
Range	0–49	0–52	0–36	0–17	4–23	1–23				

* $p < .05$.

** $p < .01$.

conducted to predict self-reported agoraphobia (APPQ-Agoraphobia) and clinician-rated agoraphobia (using the ADIS-IV-L scale). For each of the equations, the main effects of anxiety sensitivity (ASI-Physical Concerns) and perceived control (PC-Emotion, PC-Threat) were entered in Step 1. The two-way interactions were entered in Step 2 to examine the potential moderating effect of perceived control on the relationship between anxiety sensitivity and agoraphobia. The distributions of each of the predictor and criterion measures were examined for presence of skewness and kurtosis. The distributions of all measures indicated a lack of skewness or kurtosis (values were less than 3). Because outliers can significantly distort relations between predictor and criterion variables, particularly in smaller samples, it was necessary to identify and evaluate the influence outliers may have on regression equations (Neter, Wasserman, & Kutner, 1989). One multivariate outlier was identified with Cook's distance measure D (Cook & Weisberg, 1982) and was removed from these analyses. In the hierarchical regression analyses, the continuous-level predictor and moderator variables were mean-centered, and the centered predictor and moderator terms were multiplied to form the interaction term. This procedure is recommended by Aiken and West (1991) to reduce any problems with multicollinearity and to facilitate interpretation of significant interaction effects. When interaction terms were significant, the regression lines were plotted using one standard deviation above and below the mean.¹

Results of the hierarchical regression analyses predicting agoraphobia are reported in Table 2. For self-reported agoraphobia, main effects were found for both predictors. Anxiety sensitivity (ASI-Physical Concerns) and perceived control (PC-Threat, PC-Emotion) each predicted unique variance in self-reported agoraphobia. A significant two-way interaction was found for anxiety sensitivity and perceived threat control that uniquely predicted variance in agoraphobia. The overall model predicted variance at a medium effect size ($f^2 = .23$). Plots of the regression weights indicated that the relationship between anxiety sensitivity and agoraphobia differed as a function of threat control (see Fig. 1). Among individuals with a low perception of control, those with high anxiety sensitivity showed greater agoraphobia than those with low anxiety sensitivity. These differences decreased as a function of perceived threat control, such that individuals with a high perception of control who differed in anxiety sensitivity were quite similar. The two-way interaction examining the moderating influence of perceived emotional control was not significant at $p < .05$. Overall, 19%

¹Data were analyzed with uncentered analyses first and produced identical results.

Table 2

Summary of hierarchical regression analyses for gender, anxiety sensitivity-physical concerns, and the moderating effect of perceived emotion and threat control on agoraphobia ($N = 228$)

Step and predictor variable	Agoraphobia									
	Self-reported (APPQ-A) ^a					Clinician-rated (ADIS-IV-L) ^b				
	<i>B</i>	SE <i>B</i>	β	R^2	f^2	<i>B</i>	SE <i>B</i>	β	R^2	f^2
<i>Step 1</i>										
Anxiety sensitivity—physical (ASP) ^c	.59**	.17	.22**	.16**	.19	.65**	.22	.22**	.14**	.16
Perceived threat control (PCT) ^d	-.71**	-.16	-.28**			-.67**	-.24	-.24**		
<i>Step 2</i>				.19*	.23				.17**	.20
ASPXPCT	-.07*	.03	-.15*			-.08*	.03	-.16*		
Constant	23.68**					16.88**				
<i>Step 1</i>				.13**	.15				.10**	.11
Anxiety sensitivity—physical (ASP)	.71**	.17	.26**			.85**	.19	.29**		
Perceived emotion control (PCE) ^c	-.63**	.20	-.20**			-.26	.22	-.08		
<i>Step 2</i>				n.s.					n.s.	
ASPXPCE	n.s.	n.s.	n.s.	n.s.		n.s.	n.s.	n.s.	n.s.	
Constant	23.38**					14.33**				

* $p < .05$.

** $p < .01$.

^aAlbany panic and phobia questionnaire-agoraphobia scale.

^bAnxiety disorders interview schedule for the DSM-IV-lifetime version.

^cAnxiety sensitivity index—physical concerns.

^dAnxiety control questionnaire-perceived threat control scale (PCT), perceived emotion control scale (PCE).

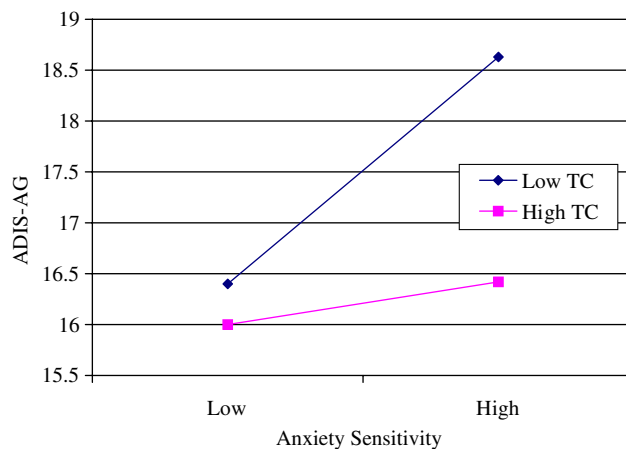


Fig. 1. Regression lines for regression of anxiety sensitivity on self-reported agoraphobia for patients at high and low levels of perceived threat control. TC refers to Anxiety Control Questionnaire-Perceived Threat Control.

and 13% of the variance in self-reported agoraphobia was accounted for by the respective equations indicating medium and small effect sizes, respectively. In the analysis of self-reported interoceptive avoidance, significant main effects were found for anxiety sensitivity (ASI-Physical Concerns), but perceived threat control (PC-Threat) and perceived emotion control (PC-Emotion) were not uniquely related to interoceptive

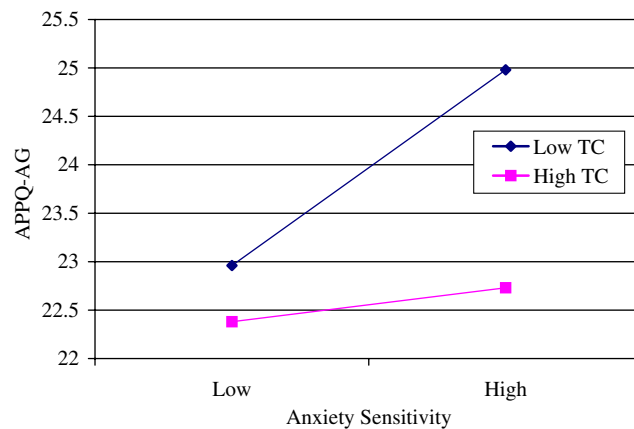


Fig. 2. Regression lines for regression of anxiety sensitivity on clinician-rated agoraphobia for patients at high and low levels of perceived threat control. TC refers to Anxiety Control Questionnaire-Perceived Threat Control.

avoidance. Overall, anxiety sensitivity was associated with increased interoceptive avoidance predicting 13% of the variance.

In the analysis of clinician-rated agoraphobic avoidance, significant main effects were found for anxiety sensitivity (ASI-Physical Concerns) and perceived threat control (PC-Threat). Perceived emotional control (PC-Emotion) was not uniquely related to clinician-rated agoraphobic avoidance. Consistent with the results of self-reported agoraphobia, a two-way interaction was found for anxiety sensitivity and perceived threat control that uniquely predicted variance in clinician-rated agoraphobia. The overall model predicted variance at a medium effect size ($f^2 = .23$). Examination of the regression weights again demonstrated that the anxiety sensitivity–agoraphobia relationship differed as a function of perceptions of threat control (Fig. 2). Among individuals with a low perception of control, those with high anxiety sensitivity showed greater agoraphobia than those with low anxiety sensitivity. Again, these differences decreased as a function of perceived threat control; those reporting high-perceived threat control were quite similar regardless of level of anxiety sensitivity. Overall, 17% and 10% of the variance in self-reported agoraphobia was accounted for by the respective equations indicating medium and small effect sizes, respectively.

Discussion

This study examined the relationship between anxiety sensitivity and agoraphobia and the extent to which perceived control moderated this relationship. Two aspects of perceived control were investigated, perceptions of emotional control and perceptions of control over threatening events. Consistent with theory, it was expected that anxiety sensitivity would be positively related with agoraphobia, and that this relationship would be moderated by perceptions of control. Results indicated that anxiety sensitivity and perceptions of control (both threat and emotional control) were associated with agoraphobia; patients who were fearful of the physical symptoms of anxiety and who perceived themselves to have little control (over threatening situations and emotions) exhibited more phobic avoidance. For the tests of moderation, the relationship between anxiety sensitivity and agoraphobia differed as a function of threat control, and this result was consistent across self-reported and clinician-rated agoraphobic avoidance. Among individuals with a low perception of threat control, those with high anxiety sensitivity showed agoraphobic avoidance in the moderate-to-severe range (i.e., they scored > 18 on the ADIS-Agoraphobia scale) as compared to those with low ASI scores who scored in the mild range of agoraphobia. Unlike perceptions of threat control, perceptions of emotional control did not moderate the anxiety sensitivity–agoraphobia relationship. These findings may suggest a specificity of perceptions of situational control rather than emotional control on agoraphobia. That is, it may be that perceptions of control over threatening situations, rather than perception of control over the sensations themselves, has the most impact on the anxiety sensitivity–agoraphobia relationship. Another

possibility for the failure to find a moderating impact of perceived emotion control on the ASI–agoraphobia relationship, however, is that the ACQ-Emotion Control scale may assess emotions that are not perceived as frightening to patients with PD. Indeed, it may be that the ACQ factors relate differentially to various emotional disorders (e.g., the ACQ-Emotion Control to generalized anxiety disorder; Brown et al., 2004). In sum, the hypothesis that perceived control may moderate the relationship between anxiety sensitivity and agoraphobia was partially supported.

These results lend empirical support for the influence of perceived control in models of PD (Barlow, 2002; White & Barlow, 2002), and these findings garner support for the cross-sectional influence of perceived control in the development and maintenance of agoraphobia, often the most impairing complication of PD. Research has consistently found that individuals who perceive limited control over aversive bodily or environmental events are at increased susceptibility to anxiety-related distress (Chorpita & Barlow, 1998; Mineka & Zinbarg, 1996), and this study suggests that this influence extends to situational avoidance in PD. Although perceived control has been shown to influence the occurrence of panic attacks in PD (Rapee et al., 1986; Sanderson et al., 1989), this is the first study that we are aware of that has shown this influence to extend beyond the panic attacks themselves to the behavioral component of agoraphobia. This finding is consistent with current conceptual models that posit the central role of low perceived control in the development of anxiety and depression (Alloy, Kelly, Mineka, & Clements, 1990; Barlow, 2002; Mineka, Watson, & Clark, 1998). Our results suggest that individuals who are fearful of the physical symptoms of anxiety may also be most influenced by both dispositional (e.g., perceptions of control) and situational variables (e.g., threatening events), and it is this combination that results in increased agoraphobia. Avoidance of situations then, may result from both the appraisal that a situation is uncontrollable or threatening (low perceptions of control) and the fear that physical symptoms themselves are dangerous (anxiety sensitivity).

It may be that for patients suffering PD who are faced with the possibility of panic, their method of coping with a frightening situation is in and of itself an attempt to control it—whether by altering the environment, changing the meaning of the situation, managing their emotions and behaviors—and/or by avoiding it. For this study among individuals with PD, those who believed themselves to have limited situational and emotional control were more likely to show increased avoidance. Related to control, other research has shown that panic expectancy is associated with agoraphobia (Craske, Rapee, & Barlow, 1988), and panic attacks that occur in less controllable situations are associated with *more anxiety* than panic attacks that occur in more controllable conditions (Craske et al., 1990). Other closely related, but more experiential, parameters such as perceived predictability and loss of control (cf. Foa, Zinbarg, & Rothbaum, 1992; Mineka & Kelly, 1989; Zvolensky, Eifert, Lejuez, & McNeil, 1999; Zvolensky, Eifert, Lejuez, Hopko, & Forsyth, 2000) may also be particularly relevant. In sum, these results in combination with past studies support the role of control in PD with agoraphobia. As the current study results are limited to a predominantly Caucasian, treatment seeking, outpatient sample, additional research is needed to substantiate these findings (e.g., in community samples, in varied ethnic and racial samples). This cross-sectional study of treatment-seeking patients precludes longitudinal examinations of causal pathways. Longitudinal studies are needed to examine these relations prospectively to determine whether anxiety sensitivity and perceived control pose as risk factors for later occurrence of panic attacks and the development, maintenance, or recurrence of avoidance behavior in PD.

Improving our understanding of the role of perceived control in agoraphobia may provide valuable insight into the development, assessment, and treatment of PD. First, the findings of this study highlight the importance of assessing the range of agoraphobia, however, assessment of both the obvious to more subtle interoceptive and experiential fear and avoidance behaviors has been largely neglected in previous studies of PD. Future studies are needed to extend the traditional assessment of overt avoidance to include the full range of phobic avoidance in PD. Agoraphobia may be evident in refusal or evasion of a situation to prevent anticipated danger (e.g., supermarket), avoidance of interoceptive activity that elicits symptoms similar to panic (e.g., exercise, sexual activity), departure from a situation when anxiety occurs (e.g., leaving a mall when the symptoms begin), and avoidance of experiential and attentional focus through the use of diversion tactics (e.g., distraction, counting, safety behaviors). This study included an examination of situational and interoceptive avoidance, but future research is needed to continue to fully assess and examine the more subtle dimensions of agoraphobia including experiential avoidance. Although this study found an absence for the moderating influence of perceived emotion control on interoceptive avoidance, it is notable that the majority

of the items on the scale used to assess interoceptive fear and avoidance (APPQ-I; Brown et al., 2005) pertain to physical exertion (e.g., hiking, running up stairs). It may be that the current version of this scale may under-represent the construct of interoceptive fears, and revisions are underway by our group to more fully assess the range of activities and sensations that are interoceptively fearful. Second, nearly all evidence-based treatments for PD include components addressing core components of cognitive restructuring (including psychoeducation about the nature and physiology of anxiety and panic), interoceptive exposure, and situational exposure. Contemporary cognitive-behavioral treatments for PD often address individual perceptions of control indirectly through cognitive restructuring (i.e., correcting probability overestimations, or reducing catastrophizing) or exposure exercises. Perceived control theory suggests that perceptions of control, regardless of actual degree of control, directly influence positive or negative outcomes that one experiences (Lazarus & Folkman, 1984). For this sample of patients with PD, lower perceptions of control were indeed associated with increased phobic avoidance and a stronger anxiety sensitivity–agoraphobia relationship. This finding is consistent with traditional emotion theory and research suggesting that unexpected events produce greater distress than expected events (Lazarus & Folkman, 1984). These findings may have implications for enhancing assessment and treatment focused on reducing phobic avoidance in PD. A vital component of most contemporary treatments for PDA includes decreasing internal sensitivity to anxiety symptoms (physical and emotional reactions) and increasing exposure to feared situations (situational exposure); results from this study suggest that the relationship between these two treatment goals may be improved by directly helping patients entertain more accurate perceptions of control (or lack of control) over both the situations and the emotions accompanying panic attacks.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Alloy, L. B., Kelly, K. A., Mineka, S., & Clements, C. M. (1990). Comorbidity of anxiety and depressive disorders: A helplessness-hopelessness perspective. In J. D. Maser, & C. R. Cloninger (Eds.), *Comorbidity of mood and anxiety disorders* (pp. 499–543). Washington, DC: American Psychiatric Press.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- Barlow, D. H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York: Guilford.
- Beck, A. T. (1988). Cognitive approaches to panic disorder: Theory and therapy. In S. Rachman, & J. D. Maser (Eds.), *Panic: Psychological perspectives* (pp. 91–109). Hillsdale, NJ: Erlbaum.
- Broadbent, D., & Broadbent, M. (1988). Anxiety and attentional bias: State and trait. *Cognition and Emotion*, 2, 165–183.
- Brown, T. A., Di Nardo, P. A., Lehman, C. L., & Campbell, L. A. (2001). Reliability of *DSM-IV* anxiety and mood disorders: Implications for the classification of emotional disorders. *Journal of Abnormal Psychology*, 110, 49–58.
- Brown, T. A., White, K. S., & Barlow, D. H. (2005). Interoceptive and behavioral avoidance in anxiety: Psychometric re-evaluation of the Albany Panic and Phobia Questionnaire. *Behaviour Research and Therapy*, 43, 337–355.
- Brown, T. A., White, K. S., Forsyth, J. P., & Barlow, D. H. (2004). The structure of perceived emotional control: Psychometric properties of a revised Anxiety Control Questionnaire. *Behavior Therapy*, 35, 75–99.
- Buller, R., Maier, W., & Benkert, O. (1986). Clinical subtypes of panic disorder: Their descriptive and prospective validity. *Journal of Affective Disorders*, 11, 105–114.
- Buller, R., Maier, W., Goldenberg, I. M., Lavori, P. W., et al. (1991). Chronology of panic and avoidance, age of onset in panic disorder, and prediction of treatment response: A report from the Cross-National Collaborative Panic Study. *European Archives of Psychiatry and Clinical Neuroscience*, 240, 163–168.
- Chorpita, B. F., & Barlow, D. H. (1998). The development of anxiety: The role of control in early environment. *Psychological Bulletin*, 105, 456–466.
- Clark, D. M., & Ehlers, A. (1993). An overview of the cognitive theory and treatment of panic disorder. *Applied and Preventive Psychology*, 2, 131–139.
- Cook, R. D., & Weisberg, S. (1982). *Residuals and influence in regression*. London: Chapman & Hall.
- Craske, M. G., Miller, P. P., Rotunda, R., & Barlow, D. H. (1990). A descriptive report of features of initial unexpected panic attacks in minimal and extensive avoiders. *Behaviour Research and Therapy*, 28, 395–400.
- Craske, M. G., Rapee, R., & Barlow, D. H. (1988). The significance of panic-expectancy for individual patterns of avoidance. *Behavior Therapy*, 19, 577–592.
- Di Nardo, P. A., Brown, T. A., & Barlow, D. H. (1994). *Anxiety disorders interview schedule for DSM-IV: Lifetime version (ADIS-IV-L)*. San Antonio, TX: Psychological Corporation.
- Ehlers, A. (1995). A 1-year prospective study of panic attacks: Clinical course and factors associated with maintenance. *Journal of Abnormal Psychology*, 104, 164–172.

- Faravelli, C., & Albanesi, G. (1987). Agoraphobia with panic attacks: 1-year prospective follow-up. *Comprehensive Psychiatry*, 28, 1987.
- Foa, E. B., Zinbarg, R. E., & Rothbaum, B. O. (1992). Uncontrollability and predictability in posttraumatic stress disorder: An animal model. *Psychological Bulletin*, 112, 218–238.
- Goldstein, A. J., & Chambless, D. L. (1978). The reanalysis of agoraphobia. *Behavior Therapy*, 9, 47–59.
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64, 1152–1168.
- Katschnig, H., & Amering, M. (1998). The long-term course of panic disorder and its predictors. *Journal of Clinical Psychopharmacology*, 18, 6S–11S.
- Keller, M. B., Yonkers, K. A., Warshaw, M. G., Pratt, L. A., Gollan, J., Massion, A. O., et al. (1994). Remission and relapse in subjects with panic disorder and panic with agoraphobia. *The Journal of Nervous and Mental Disease*, 182, 290–296.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Magee, M. J., Eaton, W. W., Wittchen, H. U., McGonagle, K. A., & Kessler, R. C. (1996). Agoraphobia, simple phobia, and social phobia in the National Comorbidity Survey. *Archives of General Psychiatry*, 53, 159–168.
- Maller, R. G., & Reiss, S. (1992). Anxiety sensitivity in 1984 and panic attacks in 1987. *Journal of Anxiety Disorders*, 6, 241–247.
- Mineka, S., & Kelly, K. A. (1989). The relationship between anxiety, lack of control, and loss of control. In A. Steptoe, & A. Appels (Eds.), *Stress, personal control, and health* (pp. 163–191). New York: Wiley.
- Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, 49, 377–412.
- Mineka, S., & Zinbarg, R. (1996). Conditioning and ethological models of anxiety disorders: Stress-in-dynamic-context anxiety models. In D. A. Hope (Ed.), *Nebraska symposium on motivation: Perspectives on anxiety, panic, and fear*, Vol. 43 (pp. 135–210). Lincoln, NE: University of Nebraska Press.
- Neter, J., Wasserman, W., & Kutner, M. H. (1989). *Applied linear regression models* (2nd ed.). New York: Irwin.
- Peterson, R. A., & Reiss, S. (1992). *Anxiety sensitivity index manual* (2nd ed.). Worthington, OH: IDS Publishing.
- Rapee, R. M., Craske, M. G., & Barlow, D. H. (1994/1995). Assessment instrument for panic disorder that includes fear of sensation-producing activities: The Albany Panic and Phobia Questionnaire. *Anxiety*, 1, 114–122.
- Rapee, R., Mattick, R., & Murrell, E. (1986). Cognitive mediation in the affective component of spontaneous panic attacks. *Journal of Behavior Therapy and Experimental Psychology*, 17, 245–253.
- Rapee, R. M., Craske, M. G., Brown, T. A., & Barlow, D. H. (1996). Measurement of perceived control over anxiety-related events. *Behavior Therapy*, 27, 279–293.
- Sanderson, W. C., Rapee, R. M., & Barlow, D. H. (1989). The influence of an illusion of control on panic attacks via inhalation of 5.5% carbon dioxide-enriched air. *Archives of General Psychiatry*, 46, 157–162.
- Schmidt, N. B., Lerew, D. R., & Jackson, R. J. (1999). Prospective evaluation of anxiety sensitivity in the pathogenesis of panic: Replication and extension. *Journal of Abnormal Psychology*, 108, 532–537.
- Schmidt, N. B., Trakowski, J. H., & Staab, J. P. (1997). Extinction of panicogenic effects of a 35% CO₂-sub-2 challenge in patients with panic disorder. *Journal of Abnormal Psychology*, 106, 630–638.
- Taylor, S., & Fedoroff, I. C. (1999). The expectancy theory of fear, anxiety, and panic: A conceptual and empirical analysis. In S. Taylor (Ed.), *Anxiety sensitivity: Theory, research, and treatment of fear and anxiety* (pp. 17–33). Mahwah, NJ: Erlbaum.
- Telch, M. J., Lucas, J. A., Schmidt, N. B., Hanna, H. H., LaNae Jaimez, T., & Lucas, R. A. (1993). Group cognitive-behavioral treatment of panic disorder. *Behaviour Research and Therapy*, 31, 279–287.
- White, K. S., & Barlow, D. H. (2002). Panic disorder and agoraphobia. In D. H. Barlow (Ed.), *Anxiety and its disorders*, (2nd ed.). New York: Guilford Press.
- Wolpe, J., & Rowan, V. (1988). Panic disorder: A product of classical conditioning. *Behaviour Research and Therapy*, 26, 441–450.
- Zinbarg, R. E., Barlow, D. H., & Brown, T. A. (1997). Hierarchical structure and general factor saturation of the Anxiety Sensitivity Index: Evidence and implications. *Psychological Assessment*, 9, 277–284.
- Zinbarg, R. E., Brown, T. A., Barlow, D. H., & Rapee, R. M. (2001). Anxiety sensitivity, panic, and depressed mood: A re-analysis teasing apart the contributions of the two levels in the hierarchical structure of the Anxiety Sensitivity Index. *Journal of Abnormal Psychology*, 110, 372–377.
- Zvolensky, M. J., Eifert, G. H., & Lejuez, C. W. (2001). Offset control during recurrent 20% carbon dioxide-enriched air induction: Relation to individual difference variables. *Emotion*, 1, 148–165.
- Zvolensky, M. J., Eifert, G. H., Lejuez, C. W., Hopko, D. R., & Forsyth, J. P. (2000). Assessing the perceived predictability of anxiety-related events: A report on the Perceived Predictability Index. *Journal of Behavior Therapy and Experimental Psychiatry*, 31, 201–218.
- Zvolensky, M. J., Eifert, G. H., Lejuez, C. W., & McNeil, D. W. (1999). The effects of offset control over 20% carbon dioxide-enriched air on anxious responding. *Journal of Abnormal Psychology*, 108, 624–632.