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Avoidance-oriented coping as a predictor of panic-related distress: a test using biological challenge[☆]

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Abstract

The present experimental psychopathology study sought to investigate the extent to which pre-experimental levels of avoidance-oriented coping predict anxious and fearful responding during acute physical stress, relative to other theoretically relevant variables. Participants included 80 individuals with no known history of psychological or physical health problems. Dependent measures include self-reported anxiety, DSM-IV panic symptoms, and physiological indices of heart rate and skin conductance. Consistent with our hypotheses, the tendency to engage in avoidance-oriented coping predicted increased physical panic symptoms and self-reported anxiety elicited by biological challenge, relative to specific anxiety sensitivity (AS) dimensions. These findings are discussed in terms of how specific types of coping are associated with prototypical indices of panic

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distress, with implications for forwarding future work on emotional regulation in panic disorder.

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1. Introduction

Contemporary theories of panic disorder have addressed many of the psychobiological processes involved with production and maintenance of interoceptive anxiety and fear (Barlow, 1988; Bouton, Mineka, & Barlow, 2001; Clark, 1986; McNally, 1990). For example, the cognitive theory of panic disorder emphasizes the “catastrophic misinterpretation” of bodily processes as the fundamental mechanism involved with onset and maintenance of the disorder (Clark, 1986). Similarly, the anxiety sensitivity (AS) theory of panic disorder (Reiss, 1991) posits that people do not necessarily misinterpret bodily sensations, but rather that they remain concerned about bodily processes because of their pre-existing beliefs (McNally, 1994). Finally, conditioning theories of panic disorder suggest panic experiences condition interoceptive anxiety, a state of future-oriented bodily preparation, which potentiates the next panic attack (Barlow, 1991; Bouton et al., 2001).

Although each of the above psychobiological theories of panic disorder emphasizes specific cognitive-affective mechanisms involved with generation of panic, much less has been articulated about how individuals with, or at risk for, the disorder regulate their emotional experiences. In fact, none of the contemporary theories of panic disorder makes specific predictions about the role of emotion regulation processes in panic pathology (Barlow, 1988; Clark, 1986; McNally, 1990). In this context, emotion regulation denotes “the process by which individuals influence which emotions they have, when they have them, and how they experience and express them” (Gross, 1998, p. 275). Emotion regulation attempts aimed at reducing emotional distress can be conceptualized as coping processes (see Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Gross, 1998, for an extensive discussion of this issue). Given that coping with physical stress is an important determinant of psychological adjustment and general well being (Pennebaker, 1982), it is important to systematically address the extent to which specific types of coping relate to interoceptive anxiety and fear. This information would help refine contemporary theories of panic disorder by integrating core cognitive (Clark, 1986; McNally, 1994) or associative (Barlow, 1991; Bouton et al., 2001) learning processes with an understanding of potentially dysfunctional coping responses that occur in response to physical stress.

At a descriptive level, psychopathologists have found that persons with panic disorder often attempt to escape or avoid somatic reactivity (Borden, Clum,

Broyles, & Watkins, 1988; Cox, Endler, Swinson, & Norton, 1992). For example, individuals with panic disorder often attempt to avoid situations believed to elicit bodily reactions (Goldstein & Chambless, 1978) and use psychoactive substances in an effort to temporarily prevent and/or dampen emotional responsiveness (Kushner et al., 1996). Somewhat paradoxically, these deliberate efforts to avoid bodily arousal actually may promote anxiety-related responsivity. For example, patients with panic disorder often avoid activities that provoke short-term bodily arousal (e.g., physical exercise), resulting in overall mental and physical deconditioning across time (Schmidt, Lerew, Santiago, Trakowski, & Staab, 2000a), and subsequent hypersensitivity to physical stress (Weissman, 1991). Hayes and co-workers have generally characterized such behavior patterns as “emotional avoidance” (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), during which responding is aimed at gaining short-term relief from disturbing somatic events despite long-term negative consequences (Forsyth, 2000). It is believed that this type of responding serves to maintain, and perhaps promote, panic pathology, although direct tests of these hypotheses have not been conducted.

The vast majority of research on coping processes in panic disorder has examined self-reported coping strategies for emotionally salient events within a cross-sectional design. This body of research suggests a number of general conclusions. First, persons with panic disorder rigidly attempt to escape or avoid anxiety and panic experiences (Borden et al., 1988; Cox et al., 1992; Hughes, Budd, & Greenaway, 1999). Second, although direct tests are limited, avoidance-based coping intervention strategies are detrimental to the treatment of panic disorder. For example, Schmidt et al. (2000b) recently found breathing retraining, an avoidance-oriented strategy aimed at reducing sensations of bodily arousal, makes a weak contribution to the treatment of panic disorder and may actually impair treatment outcome. Third, correlational studies have found the self-reported tendency to avoid anxiety and fear are positively correlated with AS (Zvolensky & Forsyth, 2001), negative-reinforcement substance use patterns (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001; Stewart, Zvolensky, & Eifert, 2001), and panic attacks (Brown & Cash, 1990; Katerndahl & Talamantes, 2000).

Fourth, rigid attempts to cope in an avoidant manner with medical problems that produce states of abrupt pain or autonomic activity (e.g., angina pectoris, chronic coronary artery disease; Gotto, 1992) are associated with more frequent, and longer durations of, bodily distress. These effects are evident across a wide variety of medical and psychiatric populations (e.g., Asmundson, Norton, & Norton, 1999; Cameron, Leventhal, & Leventhal, 1995; Miller, Shoda, & Hurley, 1996), including persons with panic disorder (Eifert, Zvolensky, & Lejuez, 2001). Finally, results of recent experimental psychopathology research indicate that experimenter directed “suppression” of bodily sensations produces higher levels of self-reported anxiety among healthy persons high in pre-experimental levels of emotional avoidance, when compared to “direct observation” of those sensations

(Feldner, Zvolensky, Eifert, & Spira, *in press*). These results generally parallel those found among psychologically healthy persons for other negatively valenced emotional states (Gross & Levenson, 1997; Jackson, Malmstadt, Larson, & Davidson, 2000).

Despite the promise and general consistency of the aforementioned coping studies, psychopathologists are clearly at an early stage of understanding how specific types of coping processes relate to anxious and fearful responding during physical stress. In fact, there have not been any direct experimental psychopathology tests of the predictive validity of specific types of coping strategies in terms of anxious and fearful responding during physical stress. Such a limitation is unfortunate in terms of understanding the potential contribution of specific types of emotion regulatory styles in regard to promoting anxious and fearful responding. Based upon existing evidence (Feldner et al., *in press*) and recent theoretical conceptualizations (Forsyth, 2000; Hayes et al., 1996), it follows that rigid efforts to escape or avoid states of panic-relevant physical stress, would be more likely to produce interoceptive anxiety and fear. Hence, avoidance-oriented coping strategies would make an independent contribution to risk for panic pathology. Accordingly, to examine the impact of avoidant coping tendencies on panic-related responses to physical stress, the present study examined the predictive validity of an index of avoidance-oriented coping during panic-relevant physical stress using a well-established biological challenge procedure (Zvolensky & Eifert, 2000).

The primary aim of the present investigation was to examine the relative degree of predictive power of avoidance coping in terms of self-reported anxiety and panic symptoms (physical and cognitive), as well as peripheral indices of autonomic activity. It was hypothesized that a pre-experimental composite index of avoidance coping would predict these indices of panic distress during the challenge, even compared to other theoretically relevant variables. A second focus of the present study was to examine the predictive power of established dimensions of AS (Zinbarg, Brown, Barlow, & Rapee, 2001) using a recently developed, expanded measure of this construct (Taylor & Cox, 1998). Although a significant body of anxiety research attests to the utility of AS in predicting anxiety and fear during challenges (see Zvolensky & Eifert, 2000, for a review), all of this work has been completed with the 16-item Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986). In contrast, the expanded version of this measure, the Anxiety Sensitivity Index-Revised (ASI-R; Taylor & Cox, 1998), allows for a more detailed analysis of dimensions of AS that have not been previously examined in relation to coping efforts. Thus, a second aim of the present investigation was to test whether the Fear of Respiratory Symptoms and Fear of Cardiac Symptoms AS dimensions significantly predict post-challenge emotional distress. These specific dimensions of the AS construct have been found to predict challenge response (Zinbarg et al., 2001) and are arguably most conceptually pertinent to the elicitation of physical stress.

2. Method

2.1. Participants

In total, 167 students in introductory psychology classes were screened for participation via medical questionnaire that has been previously found to accurately screen for medical and psychiatric problems (e.g., Forsyth & Eifert, 1998). Exclusionary criteria included any psychiatric diagnosis (past or current), and any use of psychotropic medication (past or current). Participants also were excluded from the study if they reported any history or symptoms of heart disease, pulmonary disorders (e.g., asthma, emphysema), or a seizure disorder. Any individual who met psychiatric exclusionary criteria was referred to West Virginia University Counseling Centers. The stringent selection criteria sought to provide a more conservative test of the coping hypothesis in this study using a nonclinical population. In this way, we could be more confident that observed differences are not consequences of having psychiatric or medical problems (i.e., contamination effects).

Of the 167 individuals screened, 33 met exclusionary criteria, and 134 were invited to participate. In total, 80 individuals (40 females; Mean age = 19.88 years, S.D. = 2.83) accepted the invitation and completed the experimental protocol. The ethnic distribution was 84.4% European-American, 7.6% African-American, 5.1% Asian-American, and 2.5% Latin-American. One participant declined to report his ethnicity. All participants completed a written consent prior to beginning the investigation, received extra credit for their participation, and were debriefed afterwards.

2.2. Self-report measures

2.2.1. Coping orientation to problems experienced (COPE)

The COPE (Carver, Scheier, & Weintraub, 1989) is a 60-item assessment of the manner in which an individual generally responds to stressors. The COPE Inventory uses a four-point Likert-type format (1 = *I usually don't do this at all* to 4 = *I usually do this a lot*) to assess frequency with which the respondent implements various coping strategies that correspond to different subscales. High scores on the COPE subscales suggest that, when confronted by a stressor, the respondent frequently engages in the coping strategy described by that subscale. In the present study, the mean of participants' responses for each subscale served as subscale scores.

Carver and colleagues (1989) reported an 11-factor solution to the COPE. In addition, they reported sufficient internal consistency, with Chronbach's alpha for each scale ranging from .45 to .92 ($M = .71$). Furthermore, the authors reported adequate test-retest reliability, and good convergent and discriminant validity of COPE subscales with theoretically relevant personality indices (Carver et al., 1989). The coping strategies represented by the Denial, Mental

Disengagement, and Alcohol-Drug Disengagement subscales of the COPE can be functionally conceptualized as “avoidance” strategies (Hayes et al., 1996); they include items describing behavior that is aimed at decreasing the probability that an individual will experience emotional discomfort in the short-term (i.e., negative reinforcement oriented). Consistent with the authors’ recommendations (Carver, n.d.), an avoidance composite was utilized in the present investigation. Specifically, the participant scores on the Denial (e.g., “I refuse to believe that it has happened.”), Mental Disengagement (e.g., “I go to movies or watch TV to think about it less.”), and Alcohol-Drug Disengagement (e.g., “I drink alcohol or take drugs, in order to think about it less.”) subscales were summed and used to provide a global index of avoidance-oriented coping.

2.2.2. ASI-R

The ASI-R (Taylor & Cox, 1998) is a 36-item self-report instrument that assesses the fear of anxiety-related sensations. It was developed specifically to assess the lower-order factors of the AS construct (Reiss, 1991; Reiss & McNally, 1985). According to factor analytic research on a diverse sample of psychiatric outpatients ($n = 155$), the ASI-R has a four-factor hierarchical structure, including (1) fear of respiratory symptoms, (2) fear of publicly observable anxiety reactions, (3) fear of cardiovascular symptoms, and (4) fear of cognitive dyscontrol (Taylor & Cox, 1998). As would be expected, each dimension of the ASI-R shares a positive relationship with the global AS construct, as measured by the 16-item ASI (see Table 3 in Taylor & Cox, 1998). Good divergent validity has been demonstrated in regard to the ASI-R lower-order scores and self-reported psychotropic medication use (Taylor & Cox, 1998). Furthermore, reductions in global AS, as measured by the ASI-R, have been found among panic disorder patients who have successfully completed cognitive-behavioral treatment (Taylor & Cox, 1998). Partial correlations have indicated that lower-order factors account for unique variance in psychiatric symptom measures and are only weakly related to measures of personality, including neuroticism (Zvolensky et al., in press).

2.2.3. Diagnostic Symptom Questionnaire (DSQ)

As an index of the self-reported experience of panic symptoms at the end of the procedure, the 15-item DSQ (Rapee, Brown, Antony, & Barlow, 1992) was used to assess the occurrence and intensity of DSM-IV panic symptoms. This measure has previously been used in challenge studies to index panic symptoms (Sanderson, Rapee, & Barlow, 1989; Zvolensky, Lejuez, & Eifert, 1998). Specifically, the DSQ lists DSM-IV panic symptoms and yields composite scores for total number of panic symptoms and a mean intensity level for symptoms experienced. The mean intensity scores for the DSQ are made on a nine-point Likert type scale (0 = *not at all* to 8 = *very strongly felt*) and derived by averaging the symptoms (i.e., including zeros for those symptoms not endorsed in the average). The DSQ was administered after participants completed the 10-min inhalation interval.

2.2.4. *Subjective Units of Distress Scale (SUDS)*

Self-reported anxiety was assessed after CO₂ inhalation via a computer-generated nine-point SUDS (Wolpe, 1958). SUDS ratings for this scale ranged from zero (no anxiety) to eight (extreme anxiety).

2.3. *Physiological measures*

A Coulbourn Modular recording system assessed physiological responding on-line at a sample rate of 10 samples across all channels (± 5 V). All channels were calibrated on-line prior to sampling. The first measure assessed heart rate. Heart rate was sampled in beats per minute (bpm) using a digital Coulbourn tachometer fed through a S75-01 bioamplifier and assessed via Medi-Trace pre-gelled Ag/AgCl electrodes. Heart rate measurement followed standard bilateral positioning on either side of the participant's rib cage.

The second physiological measure was skin conductance levels, an index of activation of the sympathetic branch of the autonomic nervous system. Skin conductance (SC) was sampled in microsiemens (μ S) using a Coulbourn S71-23 isolated skin conductance coupler. SC measures were taken on the palmar surface of the first two fingers of the nondominant hand and were assessed via disposable 8-mm diameter Ag/AgCl electrodes coated with a .05 molar concentration of NaCl. Saline electrode gel was applied to all electrodes to facilitate signal detection.

2.4. *Apparatus*

2.4.1. *Laboratory layout*

Experimental sessions took place in a 2 m \times 6 m sound attenuated room at the Department of Psychology at West Virginia University. The room contained a chair and a desk holding a Pentium class computer, 16.5-in. SVGA color monitor, mouse, and keyboard. An intercom allowed the participant to communicate freely with the experimenter in the adjacent room throughout the experiment. Participants were equipped with a continuous positive pressure Downs C-Pap Mask (Vital Signs Inc., Model No. 9000), through which they inhaled the CO₂-enriched air. The experimenter room contained a 40-cylinder gas tank, which contained the CO₂-enriched air, and a one-way mirror, and a Coulbourn Modular recording device read through a Pentium class microcomputer.

2.4.2. *Panicogenic stimulus*

A mixture of 10% CO₂, balanced with compressed air was used to elicit bodily arousal. CO₂ inhalation produces abrupt autonomic arousal that mimics naturally occurring anxiety and panic symptoms (McNally, 1999; Zvolensky & Eifert, 2000). Participants in the present study received one administration of CO₂ lasting 10 min. The 10-min inhalation period was punctuated by two 30-s intervals during which participants breathed normal room air. Specifically, these intervals

began after 3 min of CO₂ inhalation, and after 6 min and 30 s of CO₂ inhalation. These “breaks” were unsignalled, and were provided in an attempt to decrease attrition by briefly removing the panicogenic stimulus. Such methodological tactics have been used successfully in other studies (e.g., Heffner & Eifert, 2001). For a comprehensive description of the standardized and automated gas delivery apparatus utilized, see Lejuez, Forsyth, and Eifert (1998).

2.5. Procedure

Upon arrival at the laboratory, participants completed a consent form explaining that the procedure involves breathing a mixture of 10% CO₂-enriched air, and that they have the right to discontinue participation at any time without penalty. Following completion of the consent form, we administered the COPE Inventory and the ASI-R. Subsequently, participants were seated in the experimental room in front of the computer while electrodes and a C-Pap mask were attached. The experimenter then left the experimental room and the participant listened to the following audiotaped message:

During the study, you will be inhaling carbon dioxide-enriched air that may produce physical and mental sensations associated with bodily arousal. You may feel your heart racing, your palms might become sweaty, you might feel dizzy and you might have some trouble breathing.

When the tape finished playing, participants were asked to use the computer’s mouse to click a button on the screen to begin the inhalation period. During the experimental session, participants sat alone in the experimental room. The investigator viewed participants from behind a one-way mirror, and bi-directional communication was facilitated by an intercom. Thirty seconds after the inhalation interval finished, the computer prompted participants to complete a SUDS rating. Next, participants were asked to sit quietly for 3 min to facilitate the recording of baseline heart rate and skin conductance levels. This baseline was recorded after the inhalation period instead of before, in order to control for elevated physiological responding related to anticipatory anxiety. When this baseline period had elapsed, electrodes were removed, and participants were directed to the lab foyer where they completed the DSQ. Participants then were debriefed and dismissed.

3. Results

3.1. Zero-order relations

Zero-order correlations were first computed between the predictor and criterion variables in order to determine the relation between these theoretically relevant constructs (see Table 1). As expected, the avoidance composite was

Table 1
Zero-order correlations between primary predictors and dependent measures

Predictors	Dependent measures		
	DSQ physical symptoms	DSQ cognitive symptoms	SUDS
Avoidance composite	.40**	.25*	.27*
ASI-R fear of cardiac symptoms	.18	.26*	.17

Note: $N = 80$. DSQ: Diagnostic Symptom Questionnaire (Rapee et al., 1992); ASI-R: Anxiety Sensitivity Index-Revised (Taylor & Cox, 1998); SUDS (Wolpe, 1958).

* $P < .05$.

** $P < .01$.

positively associated with challenge-induced physical panic symptoms ($r = .40$, $P < .001$) and challenge-induced cognitive panic symptoms ($r = .25$, $P = .03$). The same general pattern and magnitude of these effects was noted when intensity (rather than occurrence) of panic symptom scores was measured. However, we report only the frequency scores to be most consistent with DSM-IV panic attack standards (APA, 1987). A similar pattern was evident for the avoidance composite and post-challenge SUDS ($r = .27$, $P = .01$), such that increased scores on the avoidance composite were associated with increased levels of challenge-induced anxiety. Significant zero-order correlations also existed between the ASI-R Fear of Cardiac Symptoms factor and CO₂-induced cognitive panic symptoms ($r = .26$, $P = .02$). Zero-order correlations were also computed to examine the relations between the theoretically relevant predictors (i.e., avoidance composite and ASI-R factors), and physiological (i.e., heart rate, skin conductance) change scores. No significant relations emerged from these analyses.

3.2. Prediction of challenge responding

Separate multiple regression analyses were conducted in order to test our primary hypotheses. In all regression analyses, demographic variables (i.e., gender, age, race, smoking status), the avoidance composite, and ASI-R factors were entered in the same block. Following the recommendations of Tabachnick and Fidell (1996, p. 156), we conducted separate stepwise multiple linear regression analyses with the primary dependent measures. A stepwise approach was used because this model allows one to enter the variables into the equation according to the strength of their association with each primary dependent variable (Tabachnick & Fidell, 1996), an approach clearly most consistent with our original aims. Each variable that met criteria for inclusion (i.e., P to enter = .05) and did not meet criteria for removal (i.e., P to remove = .10) was retained. An alpha level of .05 was used for all statistical tests. As the regression analyses revealed only one significant predictor for inclusion in each regression model, we could not calculate semi-partial correlations (sr^2) to represent effect sizes. Results of these analyses are presented in Table 2.

Table 2
Regression analyses: significant results

Predictor	Dependent variable	β	R^2
Avoidance composite	DSQ physical symptoms	.41	.17**
Avoidance composite	SUDS	.28	.08*
ASI-R fear of cardiac symptoms	DSQ cognitive symptoms	.25	.06*

Note. $N = 80$. DSQ: Diagnostic Symptom Questionnaire (Rapee et al., 1992); ASI-R: Anxiety Sensitivity Index-Revised (Taylor & Cox, 1998); SUDS (Wolpe, 1958).

* $P < .05$.

** $P < .01$.

As hypothesized, the avoidance composite was the only variable to contribute significantly to prediction of the number of DSQ-defined physical panic symptoms ($R^2 = .17$, $P < .001$). Contrary to our hypothesis, the ASI-R Fear of Cardiac Symptoms subscale was the only variable to be uniquely predictive of the number of cognitive panic symptoms elicited by the CO_2 challenge ($R^2 = .06$, $P = .02$), as measured by the DSQ. As hypothesized, the avoidance composite was the only variable predictive of increased challenge-induced anxiety, as measured by participants' post-challenge SUDS ratings ($R^2 = .08$, $P = .01$). There were no significant predictors of challenge-induced physiological responding at all.

4. Discussion

Existing theories of panic disorder emphasize the roles of cognitive (Clark, 1986; McNally, 1994) and learning-based (Barlow, 1991; Bouton et al., 2001) mechanisms in the generation and maintenance of the disorder. To be sure, a vast amount of research from a wide variety of scientific contexts generally substantiates the role of such processes in panic pathology. Yet, strikingly less attention has been devoted to understanding of the role of coping processes in the onset and maintenance of interoceptive anxiety and fear. Such lack of attention is puzzling given the general recognition that coping processes during states of physical stress, broadly considered, play a major role in determining psychological adjustment and physical well-being (e.g., Pennebaker, 1982).

The present study examined the degree to which avoidance-oriented coping predicted anxious and fearful responding during physical stress. Consistent with contemporary emotion theory and experimental psychopathology approaches, a multi-method assessment approach was utilized (Davidson, 1998; Zvolensky, Lejuez, Stuart, & Curtin, 2001b). In line with our primary hypothesis, avoidance-oriented coping significantly predicted self-reports of challenge-induced physical panic symptoms and degree of anxiety. The magnitude of these observed effects were small to medium (Cohen, 1988), suggesting that this process variable provides a meaningful degree of predictive power in regard to the self-reported experience of bodily sensations and emotional distress. Contrary to our hypothesis,

the coping composite did not significantly predict cognitive panic symptoms or physiological arousal (as indexed by direct on-line measurement). Although such response discordance is common to studies of anxiety-related phenomena generally (Zinbarg, 1998), and challenge research specifically (Zvolensky & Eifert, 2000), it has intriguing implications concerning the role of avoidance-oriented coping during panic-relevant physical stress. Specifically, these data suggest that avoidance coping is (a) more related to the perception of bodily sensations than the actual occurrence of such events, and (b) not directly related to catastrophic thinking. This latter finding, in particular, may be a function of the sample studied, namely, a medically and psychologically healthy group of participants. These results provide psychopathologists with an empirical springboard from which to further examine the extent to which these patterns exist among persons varying in panic risk (e.g., nonclinical panickers, persons with panic disorder). In a more general way, our results also indicate that rigid attempts to avoid aversive internal events are largely ineffective and may even be counterproductive (Cioffi & Holloway, 1993; Pennebaker & Beall, 1986; see also Heffner & Eifert, 2001).

Concerning the second aim of this study, we found relatively little support for the lower-order dimensions of AS, as measured by the ASI-R, in terms of predicting challenge distress. Specifically, only the Fear of Cardiac Symptoms factor was uniquely predictive of panic-related cognitive symptoms. There were no other significant effects observed for any of the AS dimensions for any of the primary dependent variables. On one hand, these results indicate that certain AS dimensions may be specifically related to theoretically relevant cognitive processes (e.g., catastrophic thinking) more than other aspects of emotional responding (e.g., physiological responsiveness). Our findings echo results from a variety of other recent investigations in this regard (e.g., Forsyth, Eifert, & Canna, 2000; Schmidt, 1999; Zvolensky, Eifert, & Lejuez, 2001a). Therefore, these data provide further support for the role of AS dimensions in panic-related cognitive distress, as would be predicted by cognitive theories of panic disorder (McNally, 1994). On the other hand, the data from the present report indicate AS lower-order dimensions, as measured by the ASI-R, may not necessarily be any more important relative to avoidance-oriented coping in terms of anxious and fearful responding to bodily sensations among healthy individuals. It is unclear whether this same pattern of results would hold for the 16-item ASI and therefore reflect an artifact of the psychometric properties of the ASI-R. Regardless, the present results indicate the potentially important emotional consequences of specific types of emotion regulation in panic-related responding (Zvolensky et al., 2001) and suggest that such processes need to be further researched and better integrated into contemporary theories of panic disorder.

Contrary to our original hypothesis, individual differences in avoidant coping failed to predict challenge-induced physiological responding. Although our finding is inconsistent with the original hypothesis, it may actually be consistent with examination of anxious and fearful responding during a biological challenge

paradigm. Specifically, given the biological challenge used in this study “calls” for a normative physiological response, variability in this particular response domain is likely to be attenuated between subjects (i.e., ceiling effect). Perhaps this is the reason why so many studies conducted in this domain have failed to uniformly find physiological differences between theoretically relevant groups. As it applies to the present study, future research addressing the role of avoidance in terms of anxious and fearful responding to bodily sensations would benefit by examining post-challenge recovery data over extended periods of time (e.g., 10-min post-challenge recovery), or by assessing different aspects of physiological responsiveness potentially less sensitive to ceiling effects (e.g., latency to maximum heart rate during the CO₂ challenge).

There are a number of caveats and directions for future research that warrant consideration. First, all of the pre-experimental psychological variables were assessed using self-report instruments. Accordingly, it is possible the observed findings were, at least in part, due to shared method variance. Although this methodological strategy was useful at the present stage of research development, it is likely that future research in this area would be enhanced through use of experimental methodologies, particularly those that can tap automatic types of coping processes as they unfold “on line.” Second, as with all quasi-experimental designs, causal relations cannot be unambiguously inferred, leaving the results open to a number of interpretations. One-way to better address this issue would be to provide a prospective assessment of how avoidance-oriented coping during physical stress prospectively relates to emotional distress in the natural environment. Finally, although we intentionally designed the study to examine psychologically and medically healthy individuals, one could attempt to extend these findings to persons with specific types of emotion-based psychopathology. In this way, researchers can determine to what extent avoidance-oriented coping is related specifically to the psychopathological state of panic disorder.

Overall, results of the present study suggest that theoretically relevant coping processes produce-heightened levels of emotional distress. Our results indicate that individual differences in avoidance-oriented coping processes predict differential aspects of emotional reactivity to physical stress. These results converge with and uniquely extend the existing evidence that coping processes are not merely consequences of emotion-based psychopathology, but function as important pre-morbid predictors of such responding.

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