Anxiety Sensitivity and Panic among College Students: Cognition, Emotion, and Somatic Symptoms

Carla Lynn Messenger

College of William & Mary - Arts & Sciences

Follow this and additional works at: https://scholarworks.wm.edu/etd

Part of the Behavioral Neurobiology Commons, Biological Psychology Commons, Cognitive Psychology Commons, and the Educational Psychology Commons

Recommended Citation


https://dx.doi.org/doi:10.21220/s2-dhqa-rm38

This Thesis is brought to you for free and open access by the Theses, Dissertations, & Master Projects at W&M ScholarWorks. It has been accepted for inclusion in Dissertations, Theses, and Masters Projects by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.
ANXIETY SENSITIVITY AND PANIC AMONG COLLEGE STUDENTS: COGNITION, EMOTION, AND SOMATIC SYMPTOMS

A Thesis presented to
The Faculty of the Department of Psychology
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree of
Master of Arts

by

Carla Messenger

1997
This thesis is submitted in partial fulfillment of
the requirements for the degree of

Master of Arts

Author

Approved, May 1997

Peter Derks

Glenn Shean

Larry Ventis
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>vi</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>METHOD</td>
<td>25</td>
</tr>
<tr>
<td>RESULTS</td>
<td>32</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>38</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>48</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>54</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>57</td>
</tr>
<tr>
<td>APPENDIX C</td>
<td>58</td>
</tr>
<tr>
<td>APPENDIX D</td>
<td>63</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

The writer wishes to express her appreciation to Professor Glenn Shean for his guidance, encouragement, and support throughout the stages of this investigation. The author also wishes to thank Professors Larry Ventis and Peter Derks for their participation as members of the reading committee. In addition, The author wishes to thank Nancy Ives and Sarah Goggin for their time and effort as research assistants throughout this project.
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Means and Standard Deviations of Scores on the Anxiety Sensitivity Index</td>
<td>65</td>
</tr>
<tr>
<td>2.</td>
<td>Means and Standard Deviations for Somatic Symptoms During Conditions</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>(Physical Exertion vs. Math)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Means and Standard Deviations for Catastrophic Cognitions During Conditions</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>(Physical Exertion vs. Math)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Means and Standard Deviations for Subjective Anxiety During Conditions</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>(Physical Exertion vs. Math)</td>
<td></td>
</tr>
</tbody>
</table>
ABSTRACT

The development of panic disorder has become a widely investigated area of concern within the past decade. Recent theoretical models have emphasized the role of cognition in the onset of anxiety and in panic attacks. Studies have found that persons experiencing panic attacks are more concerned with changes in physiology. These persons are responding to internal cues that they perceive as threatening and aversive. Over time, these episodes increase in frequency and severity, leading to the development of clinical panic disorder. The purpose of this study was to compare persons experiencing panic attacks to nonpanickers during stressful tasks to determine whether similar response patterns would occur.

Undergraduate students were screen for participation during Mass Testing and were placed into one of three groups: 1) panic, 2) no panic/high anxiety sensitivity, and 3) no panic/low anxiety sensitivity. Twenty panickers, 18 persons with high anxiety sensitivity, and 18 low anxiety sensitivity controls were asked to complete two stressful tasks, each lasting five minutes. The first task involved inflating balloons until they burst. In the second task, participants were asked to complete mental arithmetic problems and call out the answers when they had finished. Following each one-minute trial of the tasks, participants were asked to complete self-report measures of somatic symptoms, subjective anxiety level, and to record their cognition at the time. Following these tasks, participants in the panic group were given the ADIS-IV Interview for Panic Disorder.

Results yielded significant group differences with regard to somatic symptoms, subjective anxiety, and the number of catastrophic cognitions reported during the physical exertion task, with panickers and high AS S’s reporting the most distress in all cases. These results support the current theoretical model of panic, as well as a relationship between panic and anxiety sensitivity. The nature of that relationship, however, must be clarified through future research. In addition, reports of panic symptoms on the interview were consistent, overall, with those of mass testing, though fewer symptoms and panic attacks were reported during the interview. The implications of these findings in relation to future research will be discussed.
ANXIETY SENSITIVITY AND PANIC AMONG COLLEGE STUDENTS:

COGNITION, EMOTION, AND SOMATIC SYMPTOMS
EARLY THEORIES AND RESEARCH

There has been an abundance of research concerning the etiology, maintenance, and treatment of panic disorder within the past fifteen years. Much of this research has focused on the interaction between physiological mechanisms and cognitive factors involved in its development and maintenance. The effects of these factors upon the course and success of treatment have also been the focus of numerous studies.

The marked increase in the amount of research devoted to this area was due to the reformulations of the anxiety disorders that occurred within the *Diagnostic and Statistical Manual of Mental Disorders - III - R* (American Psychiatric Association, 1987). At this time, research began to emphasize the integration of panic disorder and agoraphobia as being part of the same clinical syndrome, as the *DSM-III-R* had done. Investigating the relationship between the two clinical syndromes was warranted, given that the fear of unexpected panic attacks and generalized avoidance behavior could potentially be explained by similar models of cognitive appraisal (Barlow, 1986; Beck & Emery, 1985; Clark, 1986; Margraf, Ehlers, & Roth, 1986). Another emphasis of the plethora of investigations concerning panic disorder was the conceptualization of a cognitive-physiological, or
psychophysiological model of panic disorder. This model asserts that the onset of panic attacks is precipitated by a heightened awareness of bodily sensations and a perception that these sensations are threatening. This fear of arousal increases sensitivity to interoceptive cues such that even normal physiological changes occurring within any given situation may result in the belief that these sensations are harmful. This pattern of negative cognitive appraisals of physiological change then lead to increased physiological reactivity and psychological symptoms including the fear of dying and the fear of going crazy. This cycle of fear and reactivity to fear are the hallmark of panic disorder proposed by the majority of recent psychophysiological theories (Barlow, 1988; Ehlers, 1989; Margraf, Ehlers, & Roth, 1986). The cognitive model of panic further proposes that as a result of the recurrence of these panic attacks, avoidance behaviors will occur, subsequently resulting in agoraphobia. The onset of avoidance behavior is the consequence of having multiple panic experiences and developing a fear of going out in public.

The cognitive model of panic was developed after a series of empirical studies examining the presence and frequency of physical and psychological symptoms among individuals diagnosed with panic disorder. The model was developed as an alternative to the biological models of panic disorder that
were supported at the time. The biological models asserted that panic anxiety was qualitatively distinct from other forms of anxiety in that it involved an acute, course of predominantly somatic symptoms that occur in an attack-like manner and are spontaneous. In contrast, anticipatory anxiety is the result of fears concerning specific situations and can be both predicted and avoided. Biological theories of panic propose that the experience of genuine panic attacks represent a specific biological dysfunction (Klein, 1964; Mendel & Klein, 1969). More recent support for a biological model of panic was proposed by Sheehan (1982, who divided pathological anxiety into "endogenous" and "exogenous" types. Endogenous anxiety was characterized by panic attacks that are spontaneous, while exogenous anxiety characterized all other forms of anxiety. It is reasonable to suggest that the cognitive model of panic was established in reaction to biological models because they lacked empirical support (Margraf, Ehlers & Roth, 1986). Studies attempting to detect biological markers of panic disorder that include infusion of sodium lactate (Ehlers, Margraf, Roth, Taylor, Maddock, Sheikh, Kopell, McClanahan, Gossard, Bowers, Agras, and Kopell, 1986) did not find that subjects in the clinical panic disorder group did not differ significantly on levels of physiological arousal or subjective anxiety as a result of the sodium
lactate infusion than the control group. Many studies of this nature have been conducted which have yielded similar results (Ehlers, 1989). Much of the research is in agreement that physiological mechanisms do play an important role in the onset of panic attacks and the consequent development of clinical panic disorder, however, empirical evidence indicates that biological dysfunction is most likely not the single cause of panic disorder.

Similarly, although the cognitive model of panic has contributed considerably to our understanding of the nature and maintenance of panic attacks, there remain several important questions to be addressed by future research. Furthermore, the fact that individuals with panic disorder may indeed be more sensitive to physiological changes and perceive them as aversive does not exclude other factors from influencing the development and course of panic disorder. Seeking further evidence in support of the cognitive model of panic disorder in addition to identifying other factors involved in its etiology are the rationales for continuing to conduct research in this area.

PSYCHOPHYSIOLOGICAL STUDIES OF PANIC

Typically, studies of the psychophysiological elements of panic disorder involve assessing physiological and subjective self-report responses
to some biological challenge. Several studies of this nature have measured these aspects of panic using panic induction procedures such as 5% carbon dioxide inhalation. For example, Lynch, Bakal, Whitelaw, Fung, and Rose (1992) examined the importance of agoraphobic avoidance and frequency of panic as predictors of increased physiological and psychological response to a laboratory-induced reaction of this type and found that the PD and Agoraphobia groups reported significantly more somatic and cognitive symptoms during the inhalation task than the control group. No significant differences were found, however, on the physiological measures of heart rate and respiration. Earlier studies using a similar methodology have not found identical results. Holt and Andrews (1989) measured somatic and cognitive symptoms during inhalation of carbon dioxide in addition to hyperventilation. This study examined the symptoms across four anxiety disorders: 1) Agoraphobia 2) Panic Disorder 3) Social Phobia, and 4) Generalized Anxiety Disorder. These groups were compared to a control group with no psychiatric history. Though agoraphobics and PD patients reported significantly more feelings of impending doom during the procedure than the other anxiety disorder groups and controls, significant differences were not found on levels of psychic anxiety or reports of somatic symptoms. In this study, however,
the groups were not equal in size and some groups were considerably smaller than others. This has been a methodological difficulty for many studies of panic disorder because finding clinical subjects can be an arduous task, particularly when they are frequently unwilling to participate in procedures involving physiological arousal. This is not surprising, given that experimenters often ask them to engage in tasks that precipitate anxiety and panic.

Roth, Margraf, Ehlers, Taylor, Maddock, Davies, and Agras (1992) conducted a study involving inhalation, cold pressor, and mental arithmetic as stressors and found that PD patients not only reported significantly more anxiety during and following the stress test, but they also exhibited greater anticipatory anxiety prior to the task than normal control subjects. Thus, anticipatory anxiety plays an important role in panic disorder, despite the emphasis that is placed upon the spontaneity of panic attacks. In fact, this difference in anticipatory anxiety reveals that panickers do indeed fear physiological arousal to some extent. In addition, several subjects in the panic group asked to terminate participation during the inhalation task, whereas all control subjects completed the study. This illustrates the previously mentioned point that panickers' anxious apprehension can ultimately
interfere with investigations and can effect the physiological data in particular (Barlow, 1988).

Maddock and Carter (1991) found that hyperventilation was an effective way to induce panic attacks within a group of PD patients. They also found that this task did not induce panic attacks in controls. Control subjects also did not report cognitive and somatic symptoms to the extent that panickers did. An interesting study conducted by Kenardy, Oei, Weir, and Evans (1993) found that the percent of negative thoughts reported during exposure to fear-provoking situations was positively correlated with mean heart rate and self-reported anxiety during the procedure within the PD group but not with the control group. Furthermore, longer sequences of reported positive thoughts were associated with declining subjective anxiety. These studies illustrate the interaction of physiological and cognitive components of panic, though their relationship is complex and dynamic.

An important question to consider in gaining further insight into the etiology and maintenance of panic disorder concerns vulnerability factors which may eventually lead to its development over time. This issue merits consideration because community surveys of panic disorder have revealed that panic attacks are experienced among surprisingly large percentages of
Anxiety Sensitivity and nonclinical populations. Salge, Beck, and Logan (1988) found one-year prevalence rates of 0.8% for subjects reporting frequent panic attacks; 14.1% for infrequent panickers, and 85.1% for non-panickers. This study assessed panic frequency using the Diagnostic Interview Schedule, and subjects were contacted by telephone. Joyce, Bushnell, Oakley-Browne, Wells, and Hornblow (1989) conducted a community survey of panic using the DIS and found a lifetime prevalence rate of 2.2% within the general population and 3.4% among women. The lifetime prevalence rate for panic attacks was 7.8% for the general population. In addition, the panic symptomology reported by subjects was similar for infrequent panickers and those meeting criteria for panic disorder. These studies provided additional support for investigating panic attacks within nonclinical, or infrequent panickers. However, research focusing on nonclinical populations had been initiated prior to these studies.

RESEARCH CONCERNING NONCLINICAL PANIC

Norton, Harrison, Hauch, and Rhodes (1985) assessed the presence and frequency of panic attacks among college students and found that 34% of the sample had experienced a panic attack and 2.2% had experienced at least three panic attacks within the past three weeks. Norton et al. (1985) also
found that the infrequent panickers scored significantly higher than non-
panic controls on the Hopkins Symptoms Checklist, an inventory measuring
the presence and severity of somatic, cognitive, and psychological symptoms.
Norton, Dorward, and Cox (1986) developed the Panic Attack Questionnaire
(PAQ) to assess panic frequency and symptomology within nonclinical
populations. This instrument closely adhered to DSM-III criteria of a panic
attack. When administered to college students, the PAQ revealed that 22% of
the respondents reported having had a panic attack within the previous three
weeks.

Additional research assessing panic frequency among nonclinical
populations has yielded similar results and prevalence rates. However,
questions about the accuracy of the PAQ in detecting panic experiences
motivated researchers to develop alternative measures. Telch, Lucas, and
Nelson (1989) used their own Anxiety and Panic Questionnaire to assess
panic. It was similar to the PAQ in that it represented the DSM-III-R criteria
of a panic attack, but it differed from the PAQ because it was more
descriptive concerning the nature of a panic attack and how it is distinct from
other forms of anxiety, such as social anxiety and performance anxiety. This
adjustment to the original PAQ was warranted, given that it was susceptible
Anxiety Sensitivity and 11
to a high rate of false positive reports of panic experience. The reason for this
is that the general population lacks knowledge of the specific nature of panic,
particularly spontaneous panic that is characteristic of the clinical disorder.
Because of this lack of knowledge, persons responding to questions assessing
panic attacks will misinterpret the description given and overestimate their
experiences and symptoms. Thus, more recent investigations have attempted
to decrease the frequency of false positive reports by presenting subjects with
more detailed and informative explanations of what a panic attack entails.

Brown and Cash (1989) investigated nonclinical panic among college
students using their own version of the PAQ. The Modified Panic Attack
Questionnaire consisted of an explanation of panic attacks that instructed
subjects not to report experiences of anxiety that were associated with
predicted sources of stress such as exams and performances. Further, subjects
were instructed to focus on past experiences with panic attacks of an
unexpected or “out of the blue” nature. The MPAQ more vividly
distinguished between panic attacks and other forms of anxiety commonly
experienced by college students.

Though the panic questionnaires provided explanations of panic
attacks, this did not eliminate false positive reports of panic. Therefore,
Anxiety Sensitivity and 12

researchers have begun to conduct studies of nonclinical panic using structured clinical interviews, even when studying nonclinical populations. Brown and Deagle (1992) were among the first researchers to suggest that clinical interviews should be utilized in investigations of panic whenever possible. They found that although overall prevalence rates for the experience of panic within the past year were similar for interviews and questionnaires (29.2%), the percentage of reported uncued panic attacks was significantly lower when interviews were employed (2.3%). Since a key element of clinical panic disorder is the occurrence of at least some spontaneous panic attacks, this finding was important to the future of research in this area.

Given that using a structured interview may not always be practical, particularly in screening sessions, other alternatives have been suggested which have previously shown some success. Sandler, Asmundson, Larsen, and Ediger (1991) compared the prevalence rates of a group of subjects who had received the standard PAQ with a group who received a vignette of a typical panic attack in addition to the PAQ. The additional information provided resulted in a substantially lower prevalence rate of 33.4% among those who had received the vignette compared to 51.3% among those who had only received the PAQ. The vignette consisted of a scenario of a panic
attack from its onset to its conclusion.

Despite varying prevalence rates and some inconsistency regarding specific symptoms experienced by nonclinical panickers, the majority of studies have provided evidence to support the phenomenon of nonclinical panic as a vulnerability factor to panic disorder. Most studies have suggested that nonclinical panic falls at the midpoint on a continuum between panic disorder and no experience of panic. However, it is inappropriate to conclude that experiencing panic attacks on an infrequent basis will result in the development of panic disorder. Rather, it is the experience of panic attacks in addition to other symptomology characteristic of clinical panickers that leads to vulnerability. For instance, persons who experience panic attacks infrequently may report some of the thirteen panic symptoms to a lesser degree of severity than someone with PD, however whether or not this person will eventually develop the clinical disorder is dependent upon multiple factors related to the cognitive, somatic, and physiological components of panic disorder discussed previously. The research in this area thus far, however, has addressed only a few of these issues.
ANXIETY SENSITIVITY AND PANIC

One important aspect of panic attacks that has been considered by researchers is how panickers interpret the anxiety that they experience. In addition to this question, another related factor to consider is what panickers predict the consequences of their anxiety to be both in the present and the future. Since panic-related worry is one of the criteria for panic disorder, how much does this worry affect the maintenance of panic symptoms? Most research concerning both panic disorder and nonclinical panic has reported the degree to which panickers report this worry, however few studies have focused on the extent to which worrying about the consequences of panic attacks exacerbates, or at least maintains other symptomology and psychopathology characteristic of panic disorder. This worry over the possibility of experiencing panic, or “fear of fear” has only become a topic of concern but is nonetheless central to furthering the understanding of panic within both clinical and infrequent panic populations.

Fear of fear has been recently assessed using a brief measure known as the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, and McNally, 1986). It was originally designed to study the perceived negative consequences of anxiety among persons with a variety of anxiety disorders, the ASI is steadily
Anxiety Sensitivity and 15

becoming more useful as an assessment of fear of fear among panickers and agoraphobics in particular (Reiss et al., 1986). Initial studies of the implications of utilizing the ASI revealed that it predicted responses to biological challenges such as hyperventilation. Holloway and McNally (1987) found that subjects scoring high on this 15-item self-report measure reported a significantly greater number of somatic symptoms during hyperventilation than subjects scoring low on the ASI.

Similarly, Donnell and McNally (1989) studied anxiety sensitivity and history of panic as predictors of responses to hyperventilation, and the results yielded findings consistent with those of Holloway and McNally (1987) in that subjects scoring high on the ASI exhibited a significantly greater amount of somatic symptoms during and following hyperventilation. In addition, history of panic predicted responses to hyperventilation only when accompanied by a high score on the ASI. This was one of the earliest studies integrating panic, history of panic, and anxiety sensitivity.

Surprisingly, however, few studies of that nature have been conducted. Recently, there has been an increase in the amount of interest in their relationship. Otto, Pollack, Sachs, and Rosenbaum, (1992) investigated the relationship between specific symptom characteristics of panic disorder
patients and reports of hypochondriacal concerns and found that anxiety sensitivity was the only prominent symptom of panic disorder associated with hypochondriacal concerns. Patients who were in later stages of treatment and exhibited lower anxiety sensitivity were not as focused on hypochondriacal concerns.

The relationship between anxiety sensitivity and nonclinical panic has not been explored extensively, though it is plausible to investigate, given that research supports the role of nonclinical panic attacks as a vulnerability factor of panic disorder. Asmundson, Norton, Wilson, and Sandler (1994) assessed physiological and emotional responses to hyperventilation among college students with and without a history of panic in addition to high and low anxiety sensitivity. The findings suggest that anxiety sensitivity predicted the degree of subjective anxiety reported by subjects regardless of panic history. In contrast to this finding was that of Borden and Lister (1994) who assessed cognitive and physiological responses to stress based on panic history and anxiety sensitivity and found that panic history predicted physiological and cognitive reactions rather than anxiety sensitivity. Infrequent panickers were both more physiologically responsive to the stressor and reported significantly more cognitive symptoms of anxiety and impending doom than those in the
Anxiety Sensitivity and 17
non-panic groups. However, there was no additional effect of anxiety
sensitivity. One methodological consideration worth noting about this study,
however, was that the stressor implemented was mental arithmetic. This is
not a biological challenge, and although it may succeed at increasing heart
rate, it is likely that individuals high in anxiety sensitivity would not perceive
the task as threatening. In fact, since subjects were told that their
performance would be evaluated and could predict overall intelligence,
subjects quite possibly focused their attention on the task rather than its
potentially threatening physiological effects. Attentiveness to physiological
change is a key factor involved in anxiety sensitivity.

Another possible factor contributing to anxiety sensitivity and panic is
the amount of perceived control upon reactivity to stress. Telch, Silverman,
and Schmidt (1994) found that perceived control predicted reports of
subjective anxiety. When college students were given a caffeinated substance
and told that it would produce increased physiological arousal, subjects who
scored high on the ASI and were told that they did not have to ingest the
substance reported a substantially lower degree of anxiety in response to the
task than those subjects with high ASI scores who were not given any
perceived control over whether or not they could ingest the substance. This is
an interesting experiment that has not been replicated but merits further investigation. Rapee, Mattick, and Murrell (1986) assessed physiological and cognitive reactions to carbon dioxide inhalation among nonclinical panickers, providing half of the group with an explanation of all of the possible physiological consequences of the task while the other half of the group were not given any explanation. This procedure was also implemented for a group of social phobics. Panickers who were given an explanation about the outcome reported significantly fewer somatic symptoms and significantly less anxiety than those who were given no such explanation. The social phobia group however, did not differ significantly on measures of somatic and cognitive symptoms regarding whether or not they were given an explanation of possible outcomes. Thus, information about the outcome of physical exertion and perceived control over the consequences are relevant factors for both panic history and anxiety sensitivity. Further research is warranted, however, due to the lack of supporting evidence of these findings.

Cox, Endler, and Norton (1994) found that infrequent panickers differed from non-panickers significantly only on anxiety sensitivity when they compared those two groups along with frequent panickers on measures of panic characteristics and symptomology. Thus, some relationship between
anxiety sensitivity and panic does appear to exist, even though the strength of this relationship and its subsequent consequences have yet to be revealed. The studies that have thus far been reviewed indicate that there is also some relationship between nonclinical panic attacks and the clinical disorder, however, that relationship must be more clearly defined by additional research as well.

METHODOLOGICAL ISSUES IN CURRENT RESEARCH

If further research is to provide insight into panic and anxiety sensitivity as related concepts that affect each other, several methodological issues must be addressed. First of all, future studies should focus on continuing to improve the ability of questionnaires to accurately detect the presence of panic within nonclinical populations. Though progress has been made, attempting to decrease the number of false positive reports of panic should continue. Cox et al. (1994) suggested that the questionnaires should be used in addition to structured interviews in order to obtain more descriptive information regarding the nature of panic experiences. The most appropriate use of questionnaires is for screening procedures that will be followed by structured interviews. Brown and Deagle (1992) were among the first to use
both questionnaires and interviews conjointly. They found that nonclinical panickers and clinical panickers were indeed very similar in symptomology and that the questionnaire and interview data were actually very consistent except when spontaneous panic was assessed. The interview responses yielded significantly fewer reports of spontaneous panic attacks than the questionnaire.

Another concern that needs attention in future investigations is that of gender differences. Cox et al. (1994) suggested that perhaps one possibility in attempting to increase men’s reports of panic on questionnaires is to replace the term “panic attack” with “stress reaction” on questionnaires assessing panic. This was suggested due to previous reports of gender bias regarding the willingness of men to report panic experiences (Farley, Mealiea, & Sewell, 1981). However, there have not been enough studies conducted that specifically address gender differences in the prevalence and course of panic symptoms to draw definitive conclusions regarding this matter. Cox, Swinson, Shulman, Kuch, and Reichman (1993) found very few differences between males and females diagnosed with panic disorder in terms of psychopathology and panic symptomology. The only notable significant difference concerned alcohol use after panic experiences, which was much
more common among male panic disorder patients. Since earlier findings reported that prevalence rates for panic disorder showed men to report panic much less frequently than women, many studies that concern panic disorder and nonclinical panic have focused on women to the extent that several recent studies have used women exclusively as participants in laboratory experiments. Though the effects of gender upon the phenomenon of panic have been weak in past research, many more studies must be conducted using panickers of both genders in order to determine exactly how and to what extent men and women differ when having panic attacks and subsequently developing the disorder.

One final issue that needs to be addressed is that of the role of laboratory experimentation in furthering the knowledge and understanding of panic. The majority of previous research has either focused upon the effect of biological challenge upon somatic, cognitive, and physiological reactivity among panickers, or upon using sources of mental stress to measure reactivity. These two strategies are significantly different from each other in nature and outcome. Though they have both been successful in producing panic symptoms, no research to date has assessed the effects of and differences between the two types of stress when they are compared to each
other within the same experiment. It would be interesting to determine the
differential effects of the two procedures. In addition, determining whether
mental stressors such as intelligence tests or problem-solving tasks affect the
development and maintenance of panic symptoms more or less than physical
sources of stress such as exercise or any form of physical exertion is a
question well worth addressing. Given the findings of past research
concerning panic history and anxiety sensitivity, it could be predicted that
physical exertion should produce more cognitive and physiological reactivity,
but that prediction is in need of empirical support. Perhaps most central to the
relationship between anxiety sensitivity and panic are the cognitive and
emotional components that result in the increased physiological reactivity.
PURPOSES OF THE PRESENT INVESTIGATION

The purpose of this study was to further investigate the phenomenon of panic as it occurs within a nonclinical population. Previous research has yielded inconsistent evidence concerning possible factors predisposing persons experiencing infrequent panic attacks to the development of clinical panic disorder. Although some studies have supported the theory of nonclinical panickers being at risk or vulnerable to developing panic disorder, the specific symptoms which result in this vulnerability have not been clearly identified. It appears that vulnerability to developing panic disorder involves more than experiencing some of the panic symptomology but to a lesser degree of severity and frequency, as proposed by earlier findings.

Furthermore, recent studies have investigated the construct of anxiety sensitivity in addition to studying nonclinical panic, given that it may also be a vulnerability factor in the development of panic disorder. However, the relationship between anxiety sensitivity and panic is an area that has only recently been investigated, thus warranting further investigation.

Few studies have examined anxiety sensitivity with and without a history of panic attacks. In addition, previous research has focused on the effects of anxiety and proneness to panic upon reactions to a singular type of
stress, whether it be a task of physical challenge or a task of mental stress. This study will attempt to determine the differential effects of both physical and mental stressors upon those who have prior experience with panic; those who have a panic history in addition to high anxiety sensitivity; those who have no history of panic but do have high anxiety sensitivity, and those who have no prior history of panic and who have low anxiety sensitivity. It was predicted that those who have both a history of panic and high anxiety sensitivity would report more somatic symptoms and subjective anxiety during the physical exertion than during the mental stressor, because the task resulted in greater physiological arousal than the mental task. In addition, the mental task, though increasing heart rate to some extent, would not produce the overall level of arousal that the physical exertion would yield. Also, the mental task would require the participants to concentrate and engage in cognitive functions other than attending to changes in physiology.

In addition to reporting more symptoms, it was also predicted that those with a history of panic and those with high anxiety sensitivity would record more catastrophic cognitions during the physical exertion task than nonpanickers, and there will be more of these cognitions during the physical exertion than during the mental task. Recent evidence suggests that these
catastrophic cognitions are a response to the perception of interoceptive cues as threatening. It was also hypothesized that, though panickers and those with high anxiety sensitivity would report more symptoms and cognition, panickers would be more symptomatic than the high ASI group because they have already begun to react to stress in an aversive way through their panic attacks. One question that remains unanswered is whether high anxiety sensitivity is a precursor of panic attacks, or whether the two phenomena share common features but do not necessarily co-occur.

One final hypothesis concerns the use of the ADIS-IV interview for Panic Disorder. It was hypothesized that participants would report fewer panic symptoms and fewer instances of spontaneous panic attacks when given the interview than reported on the screening questionnaire. These hypotheses address issues that may lead to a better understanding of the development, maintenance, and subsequently, the treatment of panic disorder.
Method

Participants

Approximately seven-hundred undergraduate students enrolled in Introductory Psychology courses were mass tested in their classrooms. They were administered the Anxiety Sensitivity Index (Peterson & Reiss, 1987) and the Modified Panic Attack Questionnaire (Brown & Cash, 1989). Fifty-seven subjects were selected for participation based upon their responses to these measures and were placed in one of three groups: 1) history of panic; 2) high sensitivity with no history of panic, and 3) low anxiety sensitivity and no history of panic. In order to be placed in the high anxiety sensitivity (high AS) group, prospective participants must have scored one standard deviation above the mean on the Anxiety Sensitivity Index. In contrast, placement in the low anxiety sensitivity (low AS) group required a score of one standard deviation below the mean on the ASI. Placement in the panic group was contingent upon subjects meeting several criteria. First, they must have reported experiencing at least one panic attack within the last year. In addition, subjects must have reported experiencing at least four of thirteen panic symptoms during one of these attacks, and they must also have reported that one of these attacks occurred spontaneously, or “out of the
blue”. All prospective participants must report no history of chronic medical illness which could potentially interfere with their ability to complete the laboratory procedure safely and successfully, such as asthma or heart disease.

Following the initial screening, prospective participants were contacted by telephone and asked to participate in the laboratory procedure. They were told that the experiment would take approximately one hour of their time and that they would receive one hour of the required research participation credit upon completion of the experiment. Subjects were scheduled individually for participation and were asked to refrain from smoking and ingestion of caffeine for one hour prior to the experiment in order to eliminate any possible confounds due to the intake of nicotine and caffeine.

**Apparatus:**

Nine-inch rubber balloons were used during the physiological challenge. Participants were asked to inflate these balloons until they burst, or until they are unable to inflate them any longer. During the mental challenge portion of the laboratory procedure, 3 X 5 index cards were presented to participants each containing a three-step, double-digit arithmetic problem. There were five of these problems presented to participants. A stop watch was used to time the one-minute trials.
Self-Report Measures:

**Anxiety Sensitivity Index:** (Peterson & Reiss, 1987) The ASI is a 16-item self-report inventory measuring the fear of anxiety. The items reflect concern about the possible negative consequences of anxiety. Each item is rated on a scale of 0 to 4, with total scores ranging from 1 to 64. It has shown adequate test-retest reliability and inter-item consistency (Reiss et al., 1986; Peterson & Heilbronner, 1987). Studies testing the validity of the ASI have yielded some evidence to support its use as a measure of the fear of anxiety by both behavioral validation (Maller & Reiss, 1987) as well as several cognitive appraisal domains related to the anticipated negative consequences of anxiety (Telch, Shermis, and Lucas, 1989).

**Modified Panic Attack Questionnaire:** (Brown & Cash, 1989) The MPAQ is a self-report measure assessing panic frequency and symptomology. It was developed for the purpose of screening potential participants for experiments under circumstances where it is impractical to use structured clinical interviews as a screening measure of panic. The MPAQ adheres closely to questions asked on the original Panic Attack Questionnaire (Norton,
Anxiety Sensitivity and 28

Dorward & Cox, 1986) and conforms to the *DSM-III-R* and *DSM-IV* criteria of a panic attack. Given that the criteria for panic disorder have not changed since *DSM-III-R*, it is appropriate to continue to use measures conforming to that criteria. The only modification made to the MPAQ for this experiment was the substitution of the term “panic attack” with the term “stress reaction”. This modification should not affect responses given that neither the nature of the questions will not be modified nor will their content. Previous research has suggested that it may be beneficial to use the term”stress reaction” in an attempt to eliminate or at least decrease reported gender bias in self-report measures of panic (Cox, Endler, & Norton, 1994; Farley, Maliea, & Sewell, 1981).

The MPAQ begins by giving a description of a panic attack, stating that it is not merely a reaction to an expected source of academic stress or anxiety concerning performance that would be expected in that situation. The MPAQ then gives further instructions stating that participants should only respond affirmatively if this reaction was unexpected and not triggered by a situation in which the person was the focus of attention. The remaining items requested information pertaining to the presence of panic symptoms, the frequency and severity of panic attacks, and current medications and
treatments for any medical or psychological problems. The MPAQ was used in this experiment due to its briefer format which is more conducive to time-limited screening sessions. In addition, the MPAQ has a lower reported false positive rate (9%) than the other measures according to Brown and Cash (1989).

**Bodily Symptoms Scale:** (Schmidt & Telch, 1994) The BSS is a 13-item scale for assessing bodily sensations associated with panic. These items correspond to each of the DSM-IV symptoms of panic. Each item is rated on a 0 to 4 severity scale. The BSS will be used to assess panic symptoms experienced during the physical and mental challenges.

**Subjective Units of Distress:** (SUDS) Subjects’ overall level of anxiety was rated at baseline and following each of the stress phases. Subjective anxiety was rated on a scale of 0 (absent) to 10 (very severe).

**Cognition:** Following each trial, participants were asked to write, in a sentence or two, what they were thinking while they were doing the task.
Anxiety Disorders Interview Schedule - IV: Panic Disorder: (DiNardo & Barlow, 1994) The ADIS-IV for Panic Disorder was given to subjects in the panic group following the stress induction paradigm. The purpose of administering this interview in addition to the panic screening questionnaire was to further investigate the panic history of the participants in greater depth than permitted during mass testing. The ADIS-IV was developed for clinical and research purposes and is based upon the DSM-IV criteria of panic disorder. It will be used in this experiment to determine participants’ panic history and symptomology in further detail than is permitted during mass testing due to time limitations.

Procedure:

Following screening participants for the laboratory procedure, each subject was scheduled for the experiment by the principal investigator and two female research assistants. Upon arrival at the laboratory, each participant was greeted and given a brief description of the study. The participants were not told to which group they were assigned. They were told that the study is investigating cognitive and emotional reactions to stress, but panic and anxiety sensitivity were not mentioned. Following an explanation
of the procedure, the subject was given a consent form and asked if there were any questions.

The first phase of the experiment involved the physical challenge. The participant was given a balloon, and was asked to inflate the balloon until it bursts. This phase endured for five minutes, with five successive one-minute trials. Following each trial, participants were asked to complete the BSS and SUDS scales, and to record their cognition. Participants were asked to continue to try to inflate the balloon as much as possible if they were unable to burst it.

The next phase involved the completion of the mental stressor. Participants were told that they were to complete several arithmetic problems. The problems consisted of three-step, double-digit arithmetic problems presented on 3 X 5 index cards. Participants received five problems to solve; one during each of five one-minute trials. The participant was given one minute to solve the problem without using a pencil and paper and was told to call out the answer to each problem upon completion. If they were incorrect, they attempted the problem until their answer was correct. Following giving the correct answer, they were told to complete the BSS, SUDS, and cognition for the previous trial.
At the conclusion of the mental challenge, participants in the panic group were given the ADIS-IV Interview for Panic Disorder. The participants were not told that the interview assesses panic disorder, and as was done in screening, the phrase “panic attack” will be replaced with “stress reaction”.

Upon completion of the interview participants were debriefed about the nature of the study and were permitted to ask any questions they may have. Following a brief explanation of the research, they were thanked for their participation and allowed to leave.

Results:

Analyses of Experimental Conditions

A one-way ANOVA was conducted to determine whether there were group differences between the panic group, the high ASI group, and the control group. There were indeed significant group differences, $F (2, 54) = 39.87, p < 0.0001$. Post hoc Tukey comparisons revealed that, although the panic group reported significantly higher anxiety sensitivity than did the control group, the high ASI group reported significantly greater anxiety sensitivity than both the panic and control groups. The means and standard deviations for all of the groups are reported in Table 1.
Three (Group: panic vs. high ASI vs. low ASI/control) by two (Condition: physical exertion vs. math) mixed design ANOVA’s were conducted with the between-subjects measure of group and the within-subjects measure of trials during each of the two conditions. ANOVA’s were conducted for each of the three self-report measures administered during each trial concerning somatic symptoms, cognitions, and level of subjective anxiety.

There was a significant main effect for group with regard to the somatic symptoms self-report measure, $F(2, 54) = 6.29, p < 0.003$. The panickers and the high ASI groups both reported significantly more somatic symptoms during stress than did the controls, though there was not a significant difference between the number of symptoms reported between the panic and high ASI groups. There was a significant main effect for condition as well, $F(2, 54) = 81.11, p < 0.0001$. More somatic symptoms were reported during the physical exertion condition than during the math condition for both groups. In addition, there was a significant group by
Anxiety Sensitivity and condition interaction, $F(2, 54) = 4.95, p < 0.01$. More somatic symptoms were reported during the physical exertion condition by the panic and high ASI groups than by the control group, though there was not a significant difference between the number of symptoms reported between the panic and high ASI groups. The means and standard deviations for somatic symptoms are reported in Table 2.

Insert Table 2 Here

There was a significant main effect for groups with regard to the number of catastrophic cognitions reported during the conditions, $F(2, 54) = 4.86, p < 0.01$. Once again, the panic and high ASI groups reported significantly more catastrophic cognitions during stress than did the control group, but significant differences were not found between the panic and high ASI groups with regard to the number of cognitions reported. A significant main effect for condition was found, $F(2, 54) = 52.79, p < 0.0001$, with more catastrophic cognitions reported during the physical exertion task. In addition, a group by condition interaction was found, $F(2, 54) = 6.70, p < 0.003$, with panickers and high ASI S’s reporting significantly more
catastrophic cognitions during the physical exertion task. The means and standard deviations for cognitions are reported in Table 3.

Insert Table 3 Here

Similar results were found with regard to the level of subjective anxiety experienced during the conditions. A main effect for group was found, $F(2, 54) = 5.31, p < 0.008$, with the panic and high ASI groups reporting higher levels of subjective anxiety than the control group. The mean level of anxiety reported was slightly, but not significantly, higher for the high ASI group. There was a main effect for condition, $F(2, 54) = 13.27, p < 0.001$, with higher levels of anxiety reported during physical exertion for all groups. However, there was not a significant group by condition interaction for subjective anxiety level. The means and standard deviations for anxiety level are reported in Table 4.

Insert Table 4 Here

Pearson correlation coefficients were calculated to determine whether
there was a relationship between the level of anxiety sensitivity of the
participants and the number of catastrophic cognitions that were reported.
However, there was not a significant correlation between anxiety sensitivity
and cognition.

*Analyses of Mass testing and Interview Data*

Pearson correlation coefficients were calculated to determine whether a
relationship could be found between level of anxiety sensitivity and the
number of panic attacks that were reported to have occurred "out of the blue"
on the mass testing panic questionnaire. Thus, the scores on the ASI were
correlated with the number of self-reported spontaneous panic attacks. The
ASI scores of the panickers and the number of spontaneous panic attacks
reported in mass testing were positively correlated, $r = .62$.

In addition, the total number of panic attacks occurring within the last
year reported by participants was positively correlated with the panickers
scores on the ASI, $r = .43$, however the correlation was not as strong. Several
additional correlations were calculated to determine the relationship between
number of symptoms and number of panic attacks, number of symptoms and
ASI score, and the greatest number of panic attacks and anxiety sensitivity.
These correlations, however, did not yield significant positive correlations.
In addition, one-way ANOVA’s were conducted in order to determine whether significant differences were present with regard to gender and the potential effects that it has upon the presence, frequency, and severity of panic attacks and symptomology. However, these preliminary analyses did not find any significant group differences between males and females with regard to either the frequency or severity of panic attacks. The results also did not yield a significant group difference with regard to the level of anxiety sensitivity reported by males and females.

One final question of interest concerned the types of coping mechanisms reported by participants during the interview. A frequency distribution was calculated for coping mechanisms reported by panickers. Approximately 52.9% of panickers reported that they do nothing to cope with the panic attacks, but instead just "wait them out". Some panickers reported using some type of coping mechanism, such as behavioral strategies that include breathing exercises and going to sleep (29.4%), seeking comfort or support from others (5.9%), expressing their emotions by crying (5.9%), and using alcohol or other substances (5.8%). ANOVA revealed, however, that there were not significant gender differences with regard to coping mechanisms.
Discussion

The results of the present study generally support the current model of panic according to cognitive theory. Participants with a history of panic attacks and participants with high anxiety sensitivity, as indicated by their scores on the ASI, reported a significantly greater number of somatic symptoms and catastrophic cognitions during the physical exertion task in comparison to the low ASI group. These results are consistent with the cognitive model of panic, which asserts that persons having panic attacks attend to physiological changes and perceive those changes as threatening. This “catastrophic” perception of their bodily sensations leads to their panic reactions (Barlow, 1988; Rapee, 1994; Rapee, Ancis & Barlow, 1988). The findings also are consistent with recent research concerning high anxiety sensitivity and reports of somatic symptoms (Asmundson, Norton, Wilson, & Sandler, 1994; Borden & Lister, 1994). A comparison of the research findings of these two areas yields symptom profiles that are strikingly similar, though the literature concerning anxiety sensitivity is less comprehensive.

These findings also lend some support for the assertion that nonclinical panickers are similar to those having panic disorder with regard to patterns of symptoms and cognitive appraisals. This is of particular interest, given that
this issue has been debated among researchers in the area for some time (Cox, Endler, & Norton, 1994; Cox, Endler, & Swinson, 1991; Norton, Dorward, & Cox, 1986). Most research concerning catastrophic cognitions, in particular, has focused on those individuals meeting criteria for panic disorder, therefore making it difficult to generalize results to nonclinical populations. Two recent studies, for example, have found that panickers have persistent, fearful cognitions concerning physical dangers and mental stressors over periods of time, particularly when treatment is not sought, (Zoellner, Craske, & Rapee, 1996), and when they are unaware of the potential outcome of a stressful event (Rapee, Mattick, & Murrell, 1996). Both of these studies, however recruited only participants meeting criteria for panic disorder. Thus, although these findings lent further support for current formulations of panic, the questions as to how nonclinical panickers compare in this domain remains definitively unanswered. The results of the present study, therefore, may begin to she some light on this issue.

Particularly interesting was the fact that most of the cognitions recorded during physical exertion by panickers and high ASI participants were very similar in content. For example, catastrophic cognitions consisted of statements such as "I feel dizzy and lightheaded like I’m going to faint"
and “My heart is racing out of control”. There was not great variability with regard to the content of these catastrophic cognitions. Participants were concerned with their bodily sensations and the consequences of changes in physiology. Some participants were also concerned with the consequences of the balloon bursting. For example, some responses included, “What is the balloon pops in my face and it hurts me?”, or “I don’t want it to pop and scare me”. Though some of these cognitions were reported by participants in the control group, they were uncommon overall. Participants in the low ASI group did not demonstrate concerns regarding the physiological changes that occurred as a result of the task.

Control participants did, however, demonstrate concern about their performance on the mental arithmetic task. This may help to explain why an interaction was not found regarding participants’ subjective levels of anxiety. Though panickers reported significantly greater anxiety overall, anxiety was not found to be greatest during physical exertion. The fact that control subjects reported high levels of anxiety during math may have masked the effect of the physical exertion task upon reports of anxiety by the panic and high ASI groups. The mental arithmetic task was apparently more stressful than expected for both groups. There is also the possibility that the panic and
high ASI groups did not have a sufficient amount of time to recover from the physical exertion task, and therefore were still anxious about its effects. In addition to the carry-over effect from the previous task, they now had to concentrate on a task requiring focused attention and speed, which added to their anxiety level. Somatic symptoms and catastrophic cognitions both decreased significantly during math, however, illustrating that the physical exertion task was indeed the primary source of stress for the panickers and high ASI participants.

From the findings of this study, it can be observed that persons with a history of panic and persons scoring high on a measure of anxiety sensitivity share some common concerns with regard to physiological changes and cognitive appraisals of threatening interoceptive cues. Surprisingly, their reported somatic symptoms cognitions, and anxiety levels were not significantly different during either of the stressful tasks. It was expected that individuals who had a history of panic attacks would report the greatest number of symptoms and anxiety, followed by those with a high ASI score. However, this was not the case. In fact, high ASI participants reported levels of anxiety during physical exertion even greater than those with a panic history. If anxiety sensitivity is indeed a precursor to the onset of panic
attacks as some studies have suggested (Asmundson, Norton, Wilson, & Sandler, 1994; Asmundson, Sandler, Wilson, & Norton, 1994), then why would panickers report less anxiety in reaction to threatening cues? It is important to note that the differences in reports of anxiety were not significant, however. Still, it raises an interesting question with regard to what factors do play a contributing role to the onset of panic attacks.

Even more interesting, perhaps, is that anxiety sensitivity level was positively correlated with the number of spontaneous panic attacks reported on the mass testing questionnaire. Among the panic group, those with the highest ASI scores also reported the greatest proportion of their panic attacks occurring “out of the blue”. This is perhaps the component of panic that most closely related to anxiety sensitivity. Perhaps those with the highest level of anxiety sensitivity are the most at risk for developing panic attacks. Unfortunately, research concerning the nature of the relationship between these two factors is too recent to draw any conclusions. In addition, the panickers with the highest ASI scores reported the greatest degree of panic-related worry and greatest number of physical symptoms experienced during a panic attack. It is also important to mention that only two thirds of the panic group scored one standard deviation above the mean for college students on
the ASI, which indicates that anxiety sensitivity may play an important, but not essential role in the onset of panic.

Another, perhaps more plausible, explanation of the lower ASI scores for some panickers is that some of the participants may have misinterpreted the description of panic attacks when responding to the screening questionnaire, and therefore may have not fit the criteria for a nonclinical panicker in its truest form. This is a persisting problem that researchers have attempted to curtail since research in this area began. A common misinterpretation of participants in studies of nonclinical panic is that "unexpected" panic attacks are defined by anxiety that occurs as a result of some stressful situation that was not anticipated, rather than as a spontaneous panic attack that is unrelated to environmental or social stressor (Schmidt & Telch, 1994, Brown & Deagle, 1992; Telch, Lucas, & Nelson, 1989; Brown & Cash, 1989). Therefore, it is possible that some of the panickers may have reported false positive responses with regard to the presence of spontaneous panic attacks. However, in spite of this possibility, the panic group adhered to DSM-IV criteria for panic attacks overall.

Analyses of the interview data revealed that participants in the panic group were fairly consistent with regard to the number of panic attacks
reported, as well as the number of physical symptoms reported during the panic attacks. However, there was not consistency with regard to the degree of worry over the occurrence of panic attacks and the degree of change they had undergone as a consequence of the panic attacks between the mass testing questionnaire and the interview. Participants either overestimated these factors on the screening questionnaire, or they were embarrassed to report the extent of their concern over these experiences. This finding is consistent, however with the previous research using the diagnostic interview to assess panic symptoms rather than relying solely upon self-report questionnaire (Brown & Deagle, 1992). There needs to be additional research using the ADIS-IV Interview, however, prior to making generalizations about how consistently participants will report panic frequency and symptoms on screening measures and during the interview.

Another interesting aspect of the interview data concerns the mechanisms used by participants to cope with the experience of panic attacks. More than half of the panickers reported that they did nothing after experiencing a panic attack other than simply "waiting it out". This reaction could either be due to the mild nature of their panic attacks, or it could be because they are uncertain as to how to cope with an experience such as this
one. Previous research with nonclinical panickers has found that they typically do not experience panic symptoms to the severe level that occurs for individuals with panic disorder (Asmundson, Norton, Wilson, & Sandler, 1994; Norton, Cox & Endler, 1994, Schmidt & Telch, 1994). Many participants did report using some strategy to cope with the panic attacks, however. About one-third of the participants reported behaviors such as “getting their minds off of it”, trying breathing and relaxing exercises, and sleeping to eliminate the presence of the symptoms and deal with the experience. Another coping strategy reported was seeking the support of others for comfort, such as a parent, friend, or romantic partner. In addition, a few subjects reported using alcohol, cigarettes or other chemical substances to cope with the panic attacks.

One surprising finding was that there were no significant differences with respect to gender regarding the frequency or severity of panic attacks, or the types of coping strategies used in response to panic attacks. Previous research had yielded a gender bias with regard to the under reporting of panic attacks by men (Cox, Endler, & Norton, 1994; Farley, Mealiea, & Sewell, 1981). The present study did not find that men were significantly different in any aspect of either their reports of panic symptoms or their self-reports of
physical symptoms during the tasks. This finding suggests that perhaps researchers were too soon to assume that men do not experience panic as frequently, or report anxiety less frequently than women. The only way to determine the nature and extent of panic among men is to consistently recruit them in studies of nonclinical panic and to explore possible sources of conflicting results. In addition, the high ASI group contained no significant difference with regard to the scores of men and women.

In summary, the results of the present study found nonclinical panic sufferers and persons scoring high on the ASI to be concerned with physical symptoms, and prone to experience high levels of anxiety during tasks of mild physical and mental stress. The results also suggest that nonclinical panic sufferers do demonstrate many of the same symptom patterns, both somatically and cognitively, as observed in persons with clinical panic disorder. In addition, the interview data and responses to the screening questionnaire suggest that, although nonclinical panic sufferers experience similar symptoms, the extent of panic-related worry and the degree of change in lifestyle are not reported. Furthermore, the cognitive and somatic symptoms experienced by the high ASI group were nearly identical to those of the panic group. These findings suggest that there is indeed a relationship between
anxiety sensitivity and panic attacks which warrants further investigations comparing the two phenomena.

Perhaps the best way to determine the specific nature of the relationship, and how, or if, these two factors relate to the development of panic disorder, is to conduct longitudinal research of nonclinical populations. If anxiety sensitivity is a risk factor for panic disorder, and if nonclinical panickers may be at risk, the most plausible solution is to re-assess them over time. Though this procedure would be complex and difficult, it may be that the only way to definitively pinpoint the risk factors playing a key role in the development of panic disorder is to assess a group of nonclinical panickers repeatedly over several years on measures of panic frequency and symptomology, lifestyle changes (i.e.; marriage, divorce, physical health, social relationships, etc.), and repeated administrations of the ASI. Examining the possible contributing factors increasing vulnerability may subsequently provide further insight into the current understanding of the etiology, maintenance, and treatment of panic disorder.
References


Anxiety Sensitivity and 50


APPENDICES
APPENDIX A
Modified Panic Attack Questionnaire
(Brown & Cash, 1989)

SEX: Male  Female  AGE:

Please read the following description of a reaction to stress very carefully. Then answer the following questions concerning whether or not you have ever experienced such a reaction. Please circle your answers when options are given and fill in all blanks.

Have you ever experienced a rapid, intense rush of fear, apprehension, or terror, differing from other forms of anxiety in that merely mild symptoms of nervousness that often accompany certain life circumstances (i.e.; doing well in school, work, sports or social situations) occur. Rather, the stress reaction that is being described here consists of a sudden and “out of the blue” onset of fear or anxiety, escalating into more intense feelings of apprehension and impending doom. However, some people experience both expected and unexpected reactions to stress. Therefore, if you have experienced expected or anticipated stress reactions in addition to unexpected ones, please indicate this. But answer the following questions concerning your UNEXPECTED or “out of the blue” reactions.

1) In the past year, how many of these reactions to stress have you had?

1  2  3  4  5  6  7  8  9  10  11 or more

2) In the past four weeks, how many have you had? 1  2  3  4  5  6  7  8  9  10 or more

3) What is the greatest number of these reactions you have experienced within any four week period?

1  2  3  4  5  6  7  8  9  10 or more

4) For how long (months and years) have you been experiencing these stress reactions?__________
5) How long ago was your worst stress reaction? _____Years
   ________Months    ________ Weeks

6) How many of your stress reactions have been out of the blue; unexpected?
   All          Most         Some         None

7) If you recall your first experience with stress reactions of this nature, please
   briefly describe the circumstances surrounding it (where you were, what you were
   doing, etc.)

8) How disturbing or distressing are these stress reactions to you?
   Not at All      Mildly       Moderately   Very       Extremely

9) To what degree have these experiences changed your lifestyle (activities you
   engage in; places you go)?
   No Change      Some        Moderately   Quite a Bit    Extreme

10) Do you avoid certain situations due to fear of having one of these stress
    reactions? If yes, what situations do you avoid?

11) Please indicate how severely you experienced each of the following symptoms
    during both your most recent and your most severe experience with a stress reaction
    of this nature.

   Does Not Occur       Mild       Moderate      Severe      Very Severe
   0                      1           2           3                4

   a) Shortness of breath
   b) Dizziness/Faintness
   c) Racing or pounding heart
   d) Trembling or shaking
   e) Sweating

   Most Recent           Most Severe
Anxiety Sensitivity and 56

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f) Choking</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>g) Nausea or stomach pain</td>
<td>12</td>
</tr>
<tr>
<td>h) Feelings that things are not real</td>
<td>13</td>
</tr>
<tr>
<td>i) Numbness or tingling sensations</td>
<td>14</td>
</tr>
<tr>
<td>j) Hot flashes or chills</td>
<td></td>
</tr>
<tr>
<td>k) Chest pain or discomfort</td>
<td></td>
</tr>
<tr>
<td>l) Fear of dying</td>
<td></td>
</tr>
<tr>
<td>m) Fear of going crazy</td>
<td></td>
</tr>
</tbody>
</table>

11) When you experience this type of stress reaction, generally what is the time period between the onset of the experience and the time in which the experience is at its most intense level?
   A) 0 to 10 minutes
   b) 10 to 20 minutes
   c) 20 to 30 minutes
   d) > 30 minutes

12) How much does the thought of future stress reactions of this type occurring concern you? __________________

13) To what extent (if any) have you considered seeking treatment for your reactions to stress? __________________

14) Are you currently taking any medication on a regular basis for any chronic medical illness or as part of any psychological treatment? If yes, please specify. ___
APPENDIX B

Anxiety Sensitivity Index
(Reiss, Peterson, Gursky, & McNally)

Please read the following questions carefully and circle the response that best characterizes your feelings and reactions to the following statements.

<table>
<thead>
<tr>
<th>Question</th>
<th>Very Little</th>
<th>A Little</th>
<th>Some</th>
<th>Much</th>
<th>Very Little</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) It is important to me not to appear nervous.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) When I cannot keep my mind on a task, I worry that I might be going crazy.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) It scares me when I feel shaky.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) It scares me when I feel faint.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) It is important to me to stay in control of my emotions.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) It scares me when my heart beats rapidly.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) It embarrasses me when my stomach growls.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) It scares me when I am nauseous.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) When I notice that my heart is beating rapidly, I worry that I might have a heart attack.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) It scares me when I become short of breath.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) When my stomach is upset, I worry that I might be seriously ill.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) It scares me when I am unable to keep my mind on a task.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13) Other people notice when I feel shaky.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14) Unusual body sensations scare me.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15) When I am nervous, I worry that I might be mentally ill.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16) It scares me when I am nervous.</td>
<td></td>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C
Anxiety Disorders Interview Schedule - Fourth Edition (ADIS-IV)
(DiNardo & Barlow, 1994)

PANIC DISORDER

I. Initial Inquiry

1a. Do you currently have times when you feel a sudden rush of intense fear or discomfort?
   If YES, skip to 2a.

1b. If no, have you EVER had times when you have felt a sudden rush of intense fear or discomfort?
   If yes, when was the most recent time this occurred?

If yes to either 1a or 1b, continue inquiry. If no, skip to AGORAPHOBIA (p. 8)

2a. In what kinds of situations do you have these feelings?

2b. Do you ever have these feelings come from out of the blue, for no apparent reason, or in situations where you did not expect them to occur?

If patient indicates the presence of unexpected panic symptoms, further inquiry is necessary to determine if these symptoms occur in a number of situational contexts or whether the symptoms are circumscribed to a particular type of situation (as can occur in Social or Specific Phobia).

3. How long does it usually take for the rush of fear/discomfort to reach a peak level?

4. How long does the fear/discomfort usually last at its peak level?

II. SYMPTOM RATINGS

In this section, rate symptoms ONLY for panic attacks that occur UNEXPECTEDLY, in a variety of situations. Panic symptoms that are limited
Anxiety Sensitivity and 59

to a single stimulus (I.E., enclosed places or heights, social situations, obsessional content, etc.) Should not be rated here. In mixed or uncertain cases, ratings can be completed here.

Rate the severity of each symptom that is typical of the most recent period of attacks, and, when appropriate, what characterized a typical attack in a separate past episode of disturbance. If a symptom is experienced during only some attacks, enclose a rating in parentheses.

DSM-IV defines a panic attack as a discrete period of intense fear or discomfort in which at least four of the symptoms listed below developed abruptly and reached a peak within 10 minutes. If typical attacks do not include 4 symptoms, determine if any attack includes 4 symptoms.

Use the following inquiry when rating symptoms:

1) During the panic attacks, do you usually experience.........?
2) How distressing/severe is the symptom to you” Do you experience this symptom every time you have an attack?

1. Rate the severity of typical symptoms using the following scale:

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>Very Severe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FULL LSA.

- a. Palpitations, pounding heart, or accelerated heart rate
- b. Sweating
- c. Trembling or shaking
- d. Shortness of breath or smothering sensations
- e. Feeling of choking
- f. Chest pain or discomfort
- g. Nausea or stomach distress
- h. Chills or hot flashes
- i. Dizziness, faintness, or light-head
- j. Feelings of unreality or being detached from oneself
- k. Numbing or tingling sensations
l. Fear of dying
m. Fear of going crazy
n. Fear of doing something uncontrolled

2a. If the patient reports four or more symptoms per typical attack, ask:
    Do you have periods when you have/had a sudden, unexpected rush of fear/discomfort that is/was accompanied by only one or two of these symptoms?

If yes, go back and rate severity of symptoms under LIMITED SYMPTOMS ATTACK (LSA).

B. If the patient reports less than four symptoms per typical attack, ask:
Do you have periods when you have/had a sudden unexpected rush of intense fear or discomfort that was accompanied by four or more of these symptoms?

If yes, go back and rate severity of symptoms under FULL attack column.

III. CURRENT EPISODE

Now I want to ask you about the current period of panic attacks.
la. How many panic attacks have you had in the last month?
lb. How many panic attacks have you had in the past six months?

2a. In the past month, how much have you been worried about, or how apprehensive have you been, of having another panic attack?

0 1 2 3 4 5 6 7 8
no mild Mod. Severe Very
worry Severe

b. Specifically, what types of things do you anticipate happening as a result of these attacks. (Inquire about immediate and long-term consequences).

C. Have the attacks caused you to change your lifestyle/behavior in any way? If yes, how so?
Anxiety Sensitivity and Situational avoidance (agoraphobia)
Interoceptive sensitivity/avoidance (e.g., Physical exertion, sex, caffeine, expressing strong emotions, hot places, thrilling movies, activities that heighten awareness of bodily sensations).
Safety signals (e.g. Medication, people, access to telephones or car).
Distractions (e.g. keeping t. V. On, staying involved in activities)
Lifestyle changes (e.g. Reduction in stressful activities)

3. In what ways have the panics interfered with your life (e.g., daily activities, job, social activities)? How Much are you bothered about having the attacks?

Rate interference: Distress:

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>Very Severe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4a. Can you recall your first panic attack that began your current period of attacks? If yes, when did it happen? Month Year

b. Were you under any type of stress during this time?

What was happening in your life at the time?

Were you experiencing any difficulties or changes in:
  Family relationships
  Work or school
  Finances
  Legal matters
  Health (self/others)

c. On the day of the first attack, were you taking any type of drug? (Include alcohol and caffeine) If yes, specify type and amount.

5. Just prior to or since the attacks first began, have you regularly been taking any type of drug? Specify type, amount, and dates of use.

6. Just prior to or since the attacks began, have you had any physical condition such
as inner ear problems, mitral valve prolapse, pregnancy, hyperthyroidism, hypoglycemia?

7. When did the panic attacks become a problem in that they occurred regularly and/or you became very worried or anxious about having more attacks, or the attacks caused a change in your behavior in some way?
Date of onset: Month: Year:

8. What types of things seem to trigger the attacks? (Internal thoughts, sensations, images; external feared situations, situations that elicit heightened, self-focused attention, physical effects of various activities such as caffeine, exercise, etc.)

9. When a panic attack occurs, how do you handle it?

10. Besides, the current period of panic attacks, have there been other, separate, periods of time before this when you have had these attacks?
Dates of prior attacks:
APPENDIX D

BODILY SENSATIONS SCALE
(Schmidt & Telch, 1994)

Please rate the following items on a scale from 0 (Not at all) to 4 (Very much) depending on how much you are experiencing each of the symptoms listed below.

<table>
<thead>
<tr>
<th>Item</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Shortness of breath</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Dizziness/ Faintness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Racing or pounding heart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Trembling or shaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Sweating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Choking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Nausea or stomach pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Feelings that things are not real</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Numbness or tingling sensations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) Hot flashes or chills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) Chest pain or discomfort</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) Fear of dying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13) Fear of going crazy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SUBJECTIVE UNITS OF DISTRESS

Please circle the number below which best represents your level of psychological distress and anxiety during the task.

<table>
<thead>
<tr>
<th>Not at All</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Very Anxious</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
</table>
THOUGHTS DURING STRESS

Please write below what you were thinking during the task. Try to use only one sentence if possible.
TABLES
TABLE 1: MEANS AND STANDARD DEVIATIONS OF SCORES ON THE ANXIETY SENSITIVITY INDEX

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MEAN</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panic</td>
<td>23.6</td>
<td>9.90</td>
</tr>
<tr>
<td>High ASI</td>
<td>29.8</td>
<td>6.75</td>
</tr>
<tr>
<td>Low ASI</td>
<td>8.8</td>
<td>3.15</td>
</tr>
</tbody>
</table>
### TABLE 2: MEANS AND STANDARD DEVIATIONS FOR SOMATIC SYMPTOMS DURING CONDITIONS (PHYSICAL EXERTION VS. MATH)

<table>
<thead>
<tr>
<th></th>
<th>PANIC GROUP</th>
<th>HIGH ASI GROUP</th>
<th>LOW ASI GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>M:</td>
<td>4.41</td>
<td>2.24</td>
<td>4.79</td>
</tr>
<tr>
<td>SD:</td>
<td>(1.74)</td>
<td>(1.24)</td>
<td>(1.98)</td>
</tr>
<tr>
<td></td>
<td>(1.74)</td>
<td>(1.24)</td>
<td>(1.98)</td>
</tr>
<tr>
<td></td>
<td>1.28</td>
<td>2.13</td>
<td>1.28</td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(0.72)</td>
<td>(0.54)</td>
</tr>
</tbody>
</table>
### TABLE 3: MEANS AND STANDARD DEVIATIONS FOR CATASTROPHIC COGNITIONS DURING CONDITIONS (PHYSICAL EXERTION VS. MATH)

<table>
<thead>
<tr>
<th></th>
<th>PANIC GROUP</th>
<th>HIGH ASI GROUP</th>
<th>LOW ASI GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M:</strong></td>
<td>1.73</td>
<td>0.52</td>
<td>1.47</td>
</tr>
<tr>
<td><strong>SD:</strong></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.10)</td>
</tr>
</tbody>
</table>
TABLE 4: MEANS AND STANDARD DEVIATIONS FOR SUBJECTIVE ANXIETY DURING CONDITIONS (PHYSICAL EXERTION VS. MATH)

<table>
<thead>
<tr>
<th></th>
<th>PANIC GROUP</th>
<th>HIGH ASI GROUP</th>
<th>LOW ASI GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>M:</td>
<td>6.44</td>
<td>3.00</td>
<td>7.00</td>
</tr>
<tr>
<td>SD:</td>
<td>(1.12)</td>
<td>(2.2)</td>
<td>(2.5)</td>
</tr>
</tbody>
</table>
CARLA LYNN MESSINGER

Born in Morgantown, West Virginia, August 26, 1972, the author graduated from Morgantown High School in 1990. She graduated from West Virginia University in 1994, Magna Cum Laude, with a bachelor’s degree in Psychology. This thesis was completed in partial fulfillment of the Master of Arts degree in General/Experimental Psychology at the College of William and Mary. She plans to pursue a doctorate in clinical psychology.