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An exploration of the relationship between vicarious learning experiences and panic attacks

Heather L. Pelletier
The University of Toledo

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An Exploration of the Relationship Between Vicarious Learning Experiences and Panic Attacks

by

Heather L. Pelletier, B.A.

Submitted to the Graduate Faculty in partial fulfillment of the requirements for

The Master of Arts degree in Psychology

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Advisor: Laura D. Seligman, PhD

_____
John D. Jasper, PhD

_____
Jon D. Elhai, PhD

_____
Jeanne Brockmyer, PhD

_____
Patricia Komuniecki, PhD

The University of Toledo

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An Abstract of

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This study examined gender differences in the relationship between vicarious learning experiences and anxiety sensitivity, general anxiety and panic. Additionally, the current research examined empathy as a mediator of the relationship between vicarious learning experiences and anxiety sensitivity, general anxiety, and panic. Four hundred and thirty-six adult college students completed a battery of self reports on childhood learning experiences, empathy and symptomatology of panic, anxiety and anxiety sensitivity. Multiple regression analyses to test this model were not significant. Interestingly, however, logistic regression demonstrated that females who reported a history of vicarious learning history had a 34% probability of experiencing panic attack in the past year while males had a probability of 18%. Gender differences in overall anxiety, empathy, and frequency of panic attacks replicated important findings in previous literature. Overall, the current results provide information important for identifying those at risk for experiencing panic attacks in adulthood.

Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter 1

Introduction

There has been an abundance of studies examining the prevalence and symptomatology of anxiety disorders. Although this research helped identify successful interventions for treating anxiety disorders, little research has extensively examined the onset and etiology of anxiety disorders. Effective prevention of anxiety disorders is dependent upon knowing more about underlying mechanisms that contribute to their etiology. This is an important line of research because 40 million adults in the United States suffer from an anxiety disorder.

Recent efforts to better understand mechanisms driving the onset and etiology of anxiety disorders have relied on learning theories. While learning theories have identified some heritable components of anxiety, they have failed to explain why one person may go on to develop an anxiety disorder and another does not. More specifically, why are anxiety disorders two to three times more prevalent in females than males? The lopsided prevalence rates suggest that gender-based group differences may be responsible for the unequal occurrence of anxiety disorders in men and women.

Experimental research on gender differences in anxiety symptoms found that females reported higher levels of distress and dislike to an observational fear procedure than males. (Kelly & Forsyth, 2007). This research suggests that males and females respond to anxiety differently. To date, there has been limited research to examine gender differences in the relationship between learning experiences and anxiety. In an effort to better understand this relationship, possible explanations and implications of such gender differences are discussed below.

1

Chapter 2

Review of the Literature

    Gender differences in prevalence of panic disorder.

The prevalence of anxiety disorders is higher among females than males for all of the specific anxiety disorders and across all ages (Rapee, Schniering, & Hudson, 2009). Specifically, for panic disorder, the occurrence for women is between two to five percent of the population, whereas the prevalence of panic disorder for men is between one and two percent. This gender difference is evident in clinical samples as well as epidemiological samples. Moreover, women also evidence greater severity and higher frequency of panic symptoms as compared to men (Dick, Bland & Newman, 1994; Turgeon, Marchand & Dupuis, 1998; Yonkers et al., 1998). Additionally, women report more specific symptoms to be associated with their panic attacks than men (Dick et al., 1994).

The strongest evidence for gender differences in the prevalence of panic disorder comes from epidemiological studies, which are supposedly free of the biases inherent in data from clinical samples. The earliest epidemiological survey to examine the prevalence of panic disorder in adults, The National Institute of Mental Health Epidemiological Catchment Area (ECA), was completed in 1980. Five metropolitan areas of the U.S. were surveyed (ECA, 1980). At the time, the prevalence of panic disorder was 2.2%, with prevalence in women at 3.4% while prevalence in men was .9% (ECA, 1980). The National Comorbidity Survey (NCS) was the first representative survey of the entire continental United States; data collected in the NCS examined the psychiatric status of a national probability sample of the U.S. population (Kessler, 1995). Overall, the lifetime prevalence rate for panic disorder without agoraphobia was 3.5% and 1.5%

for panic disorder with agoraphobia. Women evidenced a significantly higher rate of panic

disorder without agoraphobia than men (2% as opposed to .8%, respectively). The same gender

differences were seen in panic disorder with agoraphobia (1% as opposed to .4%, respectively).

Moreover, this gender difference held true across different age groups in the sample (Eaton et al.,

1994). The NCS also identified gender differences in onset, with women experiencing onset

earlier in life than men (Kessler et al., 1994). Similar to the NCS, an epidemiological study,

conducted in 1989 found the prevalence for panic disorder in women to be 3.4% (SE=.7%),

while the prevalence for men was .9% (SE.6%) (Joyce et al.,1989).

   Other epidemiological research has examined whether the prevalence of specific panic

symptoms differs by gender. NCS data from 609 respondents who met Diagnostic and Statistical

Manual of Mental Disorders (*DSM-III-R)* (American Psychiatric Association, 1987) criteria for

panic disorder or panic attacks were analyzed to test for gender differences across 18 panic

symptoms (Kessler et al., 1994). Both males and females reported heart pounding as the most

frequent symptom to be associated with their panic (between 94% and 97% of respondents with

panic disorder), but there were significant gender differences on other symptoms. In the group

with full-blown panic disorder, significantly more females than males reported symptoms

pertaining to breathing difficulty and shortness of breath (Sheikh, Leskin & Klein, 2002).

Interestingly, these types of symptoms are more observable than some of the other symptoms of

panic disorder that did not show gender differences (e.g., fear of dying or fear of losing control).

   In sum, while the specific prevalence rates of panic disorder for men and women have

varied somewhat from study to study, probably because of differing methodology (e.g. structured

vs. semi-structured interviews, lay vs. professional interviewers), overall, epidemiological

studies demonstrate that women evidence panic disorder and panic disorder symptoms at higher

rates and with greater severity than men. In fact, panic disorder appears to be two to three times more common in men than women. Moreover, women are more likely to experience some of the more observable symptoms of panic disorder (e.g. shortness of breath) compared to men.

Anxiety sensitivity (AS) and its relationship to panic disorder.

Anxiety sensitivity is one known risk factor for anxiety disorders in general and panic disorder in particular (Craske, DeCola, Sachs & Pontillo, 2003; Taylor, Koch & McNally, 1992). Anxiety sensitivity is defined as the fear of anxiety-related bodily sensations arising from beliefs that these sensations have harmful somatic, psychological, or social consequences (Reiss, Peterson, Gursky, & McNally, 1986). Anxiety sensitivity is a cognitive individual difference variable involving a tendency to respond fearfully to the experience of anxiety due to beliefs that anxiety symptoms signal catastrophic personal consequences such as physical illness, social embarrassment, or mental incapacitation (Reiss et al., 1986).

People with panic disorder score significantly higher on measures of anxiety sensitivity than controls (e.g. Taylor et al., 1995). For example, in a study of 313 people with anxiety disorders, ages 11 to 73 years, those with panic disorder had the highest levels of associated anxiety sensitivity, with the exception of individuals diagnosed with posttraumatic stress disorder (Stewart, Knize & Pihl, 1992). The researchers speculated that certain hypervigilance factors associated with PTSD may have inaccurately influenced how participants interpreted the concept of anxiety sensitivity that was being assessed.

Gender differences in anxiety sensitivity.

At this time, little is known about the development of anxiety sensitivity which may help in understanding both the development of panic disorder and the reasons for the observed gender differences. Intuitively, it appears that the most promising method for learning about the

4

observed gender differences in prevalence rates for panic disorder is to examine gender differences associated with the mechanisms identified as being related to panic disorder. Specifically, it may be particularly informative to study gender differences in anxiety sensitivity.

Similar to panic disorder, gender differences in anxiety sensitivity have also been found. For instance, some studies suggest that women evidence higher anxiety sensitivity in both clinical and non-clinical samples (Armstrong & Kahwaia, 2002; Foot & Koszycki, 2004; Schmidt & Koselka, 2000; and Stewart, Taylor & Baker, 1997; see Van Beek & Griez, 2003, however, for contradictory findings). Moreover, gender differences in anxiety sensitivity seem to be attributable to differences in sensitivity to physical concerns rather than social or psychological concerns (Foot & Koszycki, 2004; Stewart et al., 1997). For example, a sample of 101 outpatients with a diagnosis of panic disorder was assessed using a measure of trait anxiety. Although no gender differences were detected on the total anxiety sensitivity score, females evidenced significantly higher scores on the physical concerns subscale than males (Foot & Koszycki, 2004).

Other research examined gender differences in the predisposition to panic in individuals who did not have panic disorder or other clinical diagnoses (Kelly & Forsyth, 2007). Ninety-six participants (52 female and 44 male) were exposed to panicogenic inhalations of 20% CO_2 enriched air while physiological and self-report responses were measured. Women reported significantly higher ratings of anxiety sensitivity, fear and panic than men. Additionally, when re-assessed 30 minutes after the challenge, women continued to report significantly higher ratings of anxiety sensitivity, fear, and panic (Kelly & Forsyth, 2007).

Extant research suggests that there is conclusive evidence of gender differences in both panic disorder and anxiety sensitivity, however, little is known about the reasons for these gender

5

differences. Although the factors that account for gender differences in the prevalence and role of anxiety sensitivity remain poorly understood, much of the theory in this area has relied on various aspects of learning theory.

Why do people develop panic disorder/anxiety sensitivity? Implications from learning theory.

Somewhat recently, the study of factors associated with panic disorder and anxiety sensitivity has concluded that biology explains the development of panic disorder and anxiety sensitivity. Some biologically orientated investigators have begun to explore genetics and other biological factors in the development of panic disorder /anxiety sensitivity (Deckert, 1998), but results indicate that these factors made only a moderate contribution to the development of panic disorder /anxiety sensitivity (Kendler, 1993). While genetic or familial factors continue to be explored, social context and learning were among the primary psychological factors investigated (see review by Marks, 1986).

According to operant conditioning theories, learning can be accomplished in various ways, specifically via instrumental learning, verbal transmission, and/or vicarious learning. Instrumental learning is the process by which a person learns based on experiencing consequences, specifically, reinforcement and punishment for a particular behavior. Humans can also learn by receiving verbal information. A sender can transmit verbal information to the learner by giving direct instructions or information (e.g., "Those symptoms could be dangerous!"). Vicarious conditioning is another form of learning in which the behaviors of a model are learned or acquired by the observer, simply by observing the model and the consequences experienced by the model. According to learning theory, "Most human behavior is learned observationally through modeling; from observing others, one forms an idea of how

new behaviors are performed, and on later occasions this coded information serves as a guide for action" (Bandura, Adams, & Beyer, 1977, p.127).

Learning theories provide testable mechanisms to understand the development of anxiety disorders and more specifically, panic disorder, (Clark, 1998; Goldstein & Chambless, 1978; Razran, 1961). Classical conditioning would argue that an individual needs to experience a panic attack before he/she can develop excessive sensitivity to the physiological symptoms that are experienced during the panic attack. The emphasis of classical conditioning on the development of anxiety sensitivity, however, has been somewhat discredited by research done in the early 1990s (Cox, Endler, Norton & Swinson, 1991; Donnell & McNally, 1990). This survey research found that, of the students evidencing high anxiety sensitivity, two-thirds reported never experiencing a panic attack. Similar research suggests that high anxiety sensitivity may actually precede the experience of a panic attack (Reiss et al., 1986). In other words, there is debate in the literature about whether or not a person has to first have anxiety sensitivity in order to experience a panic attack.

Operant conditioning, or instrumental learning, suggests that increases and decreases in a behavior vary as a function of the resulting consequences (Bandura, 1977). For instance, parents may positively reinforce fear of bodily arousal by providing special attention to a child's display of fear in the context of somatic sensations, or they may negatively reinforce the behavior by allowing the child to miss school. Either of these forms of reinforcement could contribute to the development of anxiety sensitivity. Theoretically, lower levels of anxiety sensitivity would exist if the child's anxious complaints/behaviors were ignored, or met with disapproval/punishment from their parents.

Verbal transmission of information occurs when parents (or other caregivers) verbally transmit information regarding the danger of somatic arousal (e.g., "if you're feeling dizzy, you should go lay down; that could be dangerous"). In this way it may be that a child, not previously worried about somatic symptoms, begins to regard them as harmful and something to be feared. This fear of somatic symptoms becomes a learned part of the child's behavior and may develop into anxiety sensitivity.

Vicarious learning and its role in panic disorder/anxiety sensitivity.

Observational (or vicarious) learning has been suggested to be one of the several pathways to the onset of panic disorder (Bouton, Mineka, & Barlow, 2001). Individuals with close family members or parents with anxiety/ panic disorder have more opportunities for observational learning of anxious behavior which, in turn, may create a vulnerability to the development of panic disorder and/or anxiety sensitivity. In other words, these individuals are then more predisposed to learning anxious behaviors and responses than those who do not have parents with panic disorder /anxiety sensitivity simply because they have had more opportunities to observe a parent experiencing panic symptoms. Children learn many behaviors and responses (e.g. sick-role behaviors such as hospital stays, illness-related absences from work, and reported menstrual discomfort) from observation, particularly of parents or caregivers (Turkat, 1982; Whitehead, Busch, Heller & Costa, 1986). More specifically, anxious behaviors and concerns about physical symptoms may be acquired early in life following the observation of parents behaving in an anxious manner (Gerull & Rapee, 2002).

Specific learning experiences pertaining to anxiety appear to be connected to having parents who experience panic attacks, panic disorder and/or agoraphobia. Panic disorder occurs more commonly in those who have immediate relatives with panic disorder (Nocon et al., 2008);

more specifically, in offspring (Biederman et al., 2004; Hopper, 1990; and Weissman, 1989). Moreover, there is empirical evidence of a partial mediation effect of anxiety sensitivity in explaining the relationship between panic attacks and learning experiences that occur in childhood (Stewart et al., 2001). In other words, research suggests that anxiety sensitivity may be learned. If anxiety sensitivity is learned, and given that anxiety sensitivity is a risk factor for panic disorder, it could be concluded that some components of panic disorder may also be learned.

Interestingly, Ehlers (1993) found that people with panic attacks or panic disorder reported observing a significantly higher number of parental sick-role behaviors related to their parents' anxiety symptoms than people with other anxiety disorders (and normal controls). Similarly, research has also found that individuals with higher anxiety sensitivity reported more experiences involving instrumental and vicarious learning during childhood than individuals with lower anxiety sensitivity (Ehlers, 1993; Watt, Stewart & Cox, 1998). Although both instrumental and vicarious learning have been associated with high anxiety sensitivity, instrumental learning, in particular, has been suggested to play the key role in producing higher anxiety sensitivity levels (Ehlers, 1993; Muris, Merckelbach & Meesters, 1996; Ollendick & King, 1991). However, research by Muris and colleagues (2001), found that parental verbal transmission of information pertaining to somatic symptoms is also significantly associated with anxiety sensitivity.

Of the research that has been conducted to examine learning experiences, observational learning appears has the least support for contributing to higher levels of anxiety sensitivity. However, this may be because insufficient research has been conducted. For example, much of the research analyzes the relationship between observational learning and anxiety sensitivity

without examining gender differences (Elhers, 1993). It is possible that there are gender differences associated with observational learning that may impact its role in anxiety sensitivity. For example, although no relationship between observational learning and anxiety sensitivity was detected in Muris' research, gender differences were not assessed due to a small sample size (Muris, personal communication, May 19, 2009).

Overall, research suggests that learning plays an important role in the development of panic disorder and anxiety sensitivity. However, as noted by Mineka and her colleagues (Mineka & Oelhberg, 2008; Mineka & Zinbarg, 2006), early learning theories such as those discussed here, have limitations. In particular, not everyone who has a significant anxiety-related learning experience goes on to become anxious or develop an anxiety disorder. These concerns have lead to more sophisticated iterations of learning theory.

Contemporary learning theory: a focus on individual differences in learning.

The commonly accepted conceptualization of anxiety is somewhat intuitive: one develops an anxiety disorder following a frightening or traumatic event or in an extremely stressful period of time when most people would experience some level of anxiety. Although most would agree that this conceptualization is logical, it does not account for the people who experience the same sort of traumatic or stressful situations and do not develop an anxiety disorder. Therefore, the once popular behavioral/learning approaches that were considered empirically sound during the early 20th century have been criticized for not considering or addressing the individual differences that can affect the development of anxiety (Mineka & Zinbarg, 2006).

Bouton and his colleagues (2001) were among the first to examine vulnerability factors that contribute to the individual differences seen in panic disorder/anxiety sensitivity. They determined that three types of vulnerability are likely to predispose some people to anxiety,

specifically, panic disorder. The first vulnerability is genetic, such as behavioral inhibition, temperament or personality style. More specifically, genes seem to impart a vulnerability to things like neuroticism or trait anxiety (Kendler et al., 1995). Genetic vulnerabilities are considered to be moderate and nonspecific (Bouton et al., 2001).   Vulnerabilities based on temperament or personality can affect the conditioning (or lack thereof) process underlying the development of anxiety. For example, in a study of 52 college students (25 women and 27 men), results indicated that trait anxiety was associated with expectancy learning (Bouton et al.). That is, trait anxiety was significantly positively correlated with the speed of acquiring punishment expectancies (Zinbarg & Mohlman, 1998).

The second vulnerability identified by Bouton (2001) is prior learning history or experience. More specifically, learning experiences that lead a person to feel helpless or out of control may serve as a risk factor in the development of panic disorder, as well as other emotional disorders (Mineka & Zinbarg, 2006). Similarly, in a review of the literature, Chorpita and Barlow (1998) concluded that one's experience with lack of control may play an important role in the development of anxiety. It is believed that the perception of being out of control in a stressful situation can contribute to maladaptive learning of the anxious emotion which, for some people, can then become easily accessible and applied to other stressful situations that are experienced later on. The model proposed by Chorpita and Barlow (2008) suggests that a sense of control could possibly be a mediator between a stressful experience and anxiety. Over time, as the perceived lack of control regarding feeling helpless grows more stable, it will turn into anxiety (Chorpita & Barlow, 1998). In other words, potential learning experiences will lead to anxious behavior for those with a low sense of control, but will not lead to anxiety for those with a higher sense of control.

11

The third vulnerability lies within specific learning experiences pertaining to panic symptoms. Research examining this vulnerability has consistently found that individuals with higher anxiety and/or anxiety sensitivity report a higher number of instrumental and vicarious learning experiences (Ehlers, 1993; Leen-Feldner, Blumenthal, Babson, Bunaciu & Feldner, 2008; Watt et al., 1998; Watt & Stewart, 2000). Prior learning experiences specifically involving the observation of panic symptoms have the ability to set the stage for the development of panic disorder. Although a need for further investigation of the individual differences in learning has been identified, there is limited research in this area.

Gender differences in learning: vicarious conditioning.

As discussed above, contemporary learning theory has begun to focus on individual differences in susceptibility to learning experiences; however, empirical work has been sparse. Moreover, while recent developments in learning theory have generally been used to explain individual differences in anxiety (i.e., why person A goes on to develop an anxiety disorder while person B does not), the same logic could be used to explain group differences in the learning of anxiety (i.e., why group A, which shares a particular characteristic, goes on to develop an anxiety disorder after a relevant learning experience, while group B does not). Thus, these theories may help to explain the discrepancy in the rates of panic disorder/anxiety sensitivity between men and women noted earlier, and, in fact, the limited empirical data available do suggest this to be the case. For example, although few studies have investigated gender differences in the learning of panic disorder/anxiety sensitivity, the one study to most directly examine this question did find that women were more easily conditioned to panic disorder symptoms. More specifically, Kelly and Forsyth (2007), using an observational fear conditioning paradigm, found that women reported greater distress and dislike of a conditioned

stimulus (CS+) than men. This study included 59 healthy undergraduate students (30 females, 29 males) who underwent three different conditioning phases (habituation, acquisition, and extinction). Participants were told that they would be observing a model breathing air that contained CO_2. Models were instructed to simulate panic attacks during the experiment. Interestingly, women continued to report higher ratings of distress and dislike for the CS+ even during the extinction phase. This study was one of the first to experimentally demonstrate that women respond with more distress than men to an observational fear conditioning procedure and that these gender differences seem to persist (Kelly & Forsyth, 2007).

Perhaps most interesting was the statistical relationship between gender of the subject (observer) and gender of the model. Kelly and Forsyth (2007) found that women who watched a female model simulate panic symptoms during the CO_2 challenge reported that the model experienced significantly more panic symptoms than did men who observed the same model. Women did not report more symptoms than the men when watching a male model. The authors speculate that either women are more attuned to the physical symptoms of another woman, or they perceive that another woman is experiencing a more extreme reaction than men who watch a female experience fear (Kelly & Forsyth, 2007).

Although preliminary research suggests that there are gender differences in the susceptibility to anxious learning experiences, the obvious question is why this occurs. That is, what characteristics do women share that makes them more vulnerable to anxious learning or, put another way, what characteristics do men share that makes them relatively more resilient?

Empathy: a role for gender differences in the learning of panic disorder/anxiety sensitivity.

In order for a specific characteristic to explain gender differences in anxious learning, it would have to be shown that the trait both varied with gender and that there is a theoretical or empirical link with susceptibility to learning. In the case of empathy, both conditions hold true.

Empathy is the ability to understand and to some extent experience another's feelings. Much of the early research pertaining to empathy focused on the concept as either a cognitive, intellectual reaction (Dymond, 1949; Kerr & Speroff, 1954) or as a more affective, emotional reaction (Stotland, 1969). Movements toward integrating the cognitive and affective reactions in order to better explain and define empathy, produced research findings that supported this new view (Coke, Batson, & McDavis, 1978; Deutsch & Madle, 1975; Hoffman, 1977). Currently, it is the belief among empathy researchers and theorists that we can only improve our understanding and accurately conceptualize empathy, if we recognize that there are both cognitive and affective elements within the empathic response (Davis, 1983).

The impression that females are more empathic than males has been longstanding. When studied, findings have been mixed; with some researchers reporting no gender differences in empathy and others finding females to be more empathic. For example, a review of 29 studies found no gender differences in empathy (Maccoby & Jacklin, 1974); however, the definition of empathy used by researchers varied. Thus, results from this review are difficult to interpret. An extended review of the research done by Hoffman (1977) focused only on the nine studies from Maccoby's original review that defined empathy as "vicarious affect." Results indicated that, regardless of age, females obtained higher scores on empathy than males (Hoffman, 1977). Eisenberg and Lennon (1983) performed a meta-analysis to examine gender differences in empathy across the varying definitions. Results indicated that there was a large gender

difference when empathy was defined in terms of affective responding, but not when it was defined in terms of cognitive response (Eisenberg & Lennon, 1983).

In summary the two definitions of empathy are conceptually distinct constructs and treating them as equivalent or as a unified construct may not be the best approach (Davis, 1994). When measures of empathy are categorized as emotional responsiveness to another's emotional state or as perceptual, cognitive, and affective role-taking, a consistent pattern of females scoring higher than males on emotional responsiveness can be detected. This research suggests that females are indeed more affectively empathic than males. The ability to emotionally and affectively empathize with another has implications for various interpersonal interactions and experiences.

More recent research on empathy has identified a possible neural basis for gender differences in empathy using fMRI. Rueckert and Naybar (2008) examined the relationship between activation of the right cerebral hemisphere and empathy. They identified a significant correlation between activation of the right cerebral hemisphere and empathy only in women, suggesting that there may be differences between males and females on the underlying neural activation that accompanies empathic responding. This relationship had an effect size of $r^2_{pb}=.09$. Other research has found similar evidence to support a neural explanation for gender differences in empathy (Rueckert & Naybar, 2008).

Derntl et al. (2009) examined three specific domains of empathy: perspective taking, emotion recognition, and affective responsiveness. Emotional perspective taking was measured by participants' ability to correctly identify the facial expression of a masked character in a scene. Emotion recognition required participants to correctly choose an emotion from two presented simultaneously. The study measured affective responsiveness by providing

participants with a specific situation, which was likely to induce a particular emotion then asked participants to imagine how the situation might make them feel before choosing the correct emotion from a set of emotions presented. These domains are particularly relevant to the current study as they directly apply to the affective components of empathy that would allow a person to be attuned to another's anxious behavior. Results found that distinct neural networks were more activated for females than males on all three empathy tasks (perspective taking, emotion recognition, and affective responsiveness) with effect sizes ranging from $r=.59$ to, $r=.71$, respectively (Derntl et al., 2009). In other words, males and females used different parts of the brain during tasks measuring empathy. This research suggests that males and females rely on different processing strategies. Furthermore, the results provide evidence that the specific neural networks or regions of the brain activated during empathy tasks are the more emotion-related areas of the brain, including the amygdala (Derntl et al., 2009).

People with higher levels of empathy are more capable of putting themselves in somebody else's shoes than who people with lower levels of empathy. As discussed previously, these individuals may be more likely to vicariously respond to another person's feelings. It is known that females experience higher affective responses in reaction to another person's experiences. It seems as though empathy may have caused females in this particular study to have significantly different learning experiences than men when observing another woman experiencing panic symptoms. This suggests a link between empathy to the vicarious learning experiences that play a role in the development of panic disorder.

Statement of the problem.

As described earlier, panic disorder is two to three times more common in women than men. Additionally, women experience a greater frequency and higher severity of symptoms.

Yet, little is known about the reasons for these differences. It has been established that anxiety sensitivity is a risk factors for the development of panic disorder. Although it has been demonstrated that women are more sensitive to physiological symptoms, there is limited knowledge about the factors influencing the development of anxiety sensitivity and its associated gender differences. Efforts to better understand the development of anxiety sensitivity emphasize learning theory and modern learning theories emphasize the role of individual differences in determining who will become anxious in response to a potential learning experience. More work is needed to investigate the individual differences in learning that lead to the onset of panic disorder.

Focus of the present study and hypotheses.

The present study addresses some of these gaps in the research by examining the role of empathy in the development of panic disorder/anxiety sensitivity. More specifically, in the current study it was hypothesized that women would report significantly more anxiety, anxiety sensitivity and panic symptoms. Further, it was expected that whether or not one learns to be anxious from potential learning experiences will vary by gender (i.e. gender would act as a moderator). It was expected that this moderated relationship would be mediated by empathy (See Figure 1).
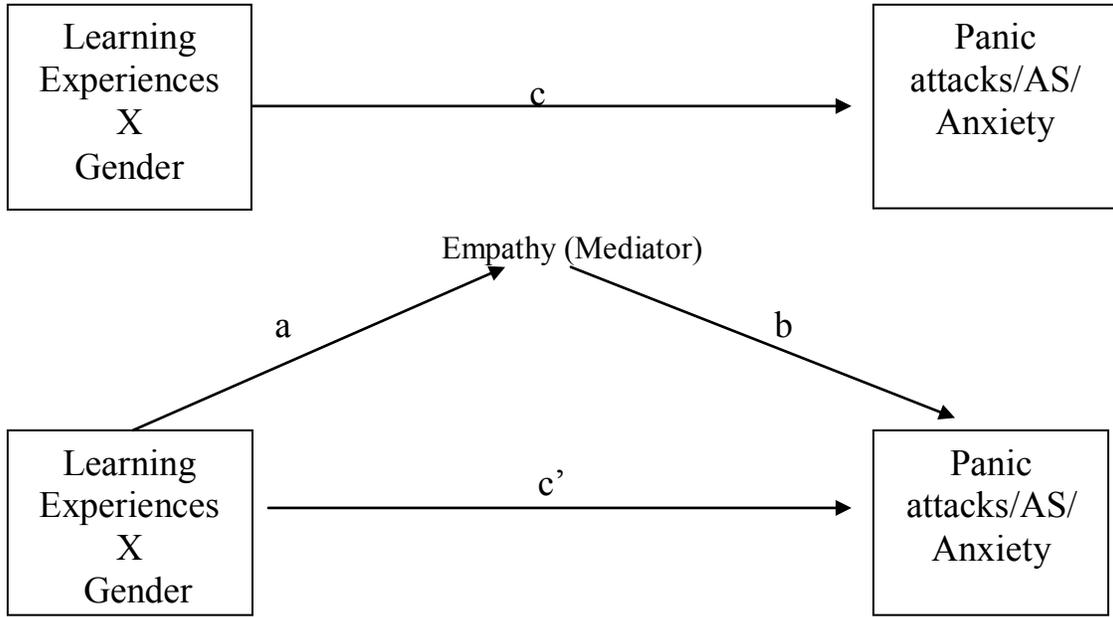
Figure 1: Mediation model for empathy. The first panel illustrates the pathway without the mediator: pathway c. The second panel illustrates the pathway with the mediator: pathway c'.

Chapter 3

Method

Power analysis to determine sample size.

An a priori power analysis was completed to calculate the number of participants needed for this study. The population effect size for the correlation between learning experiences and panic disorder/anxiety sensitivity scores was estimated to be $r = .20$ (Watt et al., 1998). The pathway between learning experiences and empathy and the pathway between empathy and panic disorder/anxiety sensitivity have not been studied. To maintain a conservative model, both of these pathways were estimated to be $\approx r = .20$. In order to have 80% confidence of detecting an effect of this size in the current study with an alpha set at .05, 2-tailed, a minimum of 153 participants was needed. In an effort to be more conservative, the target sample size was 300 participants. Although the target sample size was doubled prior to data collection, there were still concerns that a sample size of 300 participants would not be large enough to detect a significant difference, given the absence of comparable effect sizes in the literature. Therefore, data for 436 participants was collected.

Participants and procedure.

Four hundred and thirty-six adults, ranging in age from 17 to 44 (M=20.88, SD=3.5) years old were recruited from the University of Toledo. The majority of participants were female (n=329, 75.5%). 31.9% were freshman, 22.5% were sophomores, 21.8% were juniors and 23.9% were in their senior year of college. The sample was primarily Caucasian (74.1%), but also included African-Americans (16.1%), Hispanics (3.9%), Asian-Pacific Islanders (3%), and students from other ethnic groups (3%).

PsychData was used to collect data. Data were collected from online surveys, accessed by participants, through an Internet address. Data were stored on PsychData's computer servers until downloaded and imported into SPSS for analyses. Nearly all of the participants were accessed via the University's research-subject pool (SONA Systems) and given extra course credit for their participation. Two participants did not receive extra credit as they were not students registered with the research-subject pool. Both participants learned of the current study via a friend and accessed the survey simply out of interest in participating in research. The study was web-based, allowing students to complete the battery of measures from a location of their choice. Participants were told that the purpose of the study was to investigate relationships between childhood experiences and personality characteristics in young adulthood. After reading and electronically signing the provided consent form, students completed the measures listed previously. Upon completion of the study, a debriefing screen was shown to all participants before they signed out of the online study session.

Data for 19 participants were omitted. Sixteen participants electronically signed the consent form and failed to provide responses on all items of the survey. Once a survey session timed out, the data could not be re-opened by the participant unless they had created a username and password for their survey. It can be assumed that these participants were not aware that the survey session in PsychData would time out after several minutes of inactivity. It appeared as though these participants electronically signed the consent form with intention of returning at a later time to complete the survey, but had not completed the necessary steps to do so. Similar patterns of missing data were discovered for the other three participants whose data were omitted. These participants electronically signed the consent form and completed only a few items of the first measure of the survey.

Measures.

Learning history questionnaire, revised (LHQ-R; Watt et al., 1998; Appendix A).

Learning experiences related to anxiety symptoms were assessed using an expanded version of Ehlers' (1993) LHQ (Watt et al., 1998). The expanded LHQ used in the present study was designed to assess sick-role experiences/anxiety symptoms, modeling/anxiety symptoms, and sick-role experiences/cold symptoms. For the current study, the scale measuring observation of parental sick-role/anxiety symptoms was the only scale analyzed; however, participants completed the entire measure. For this reason, only the modeling/anxiety symptoms scale will be described.

Modeling/anxiety symptoms: First, participants were asked, "Did your father or mother (or other with whom you lived) suffer from symptoms such as racing heartbeat, dizziness, shortness of breath, or strong nausea?" If the participant responded, "no," they were not asked further questions about the anxious behaviors of their parents. If the participant responded, "yes", they were then asked to answer questions pertaining to their experiences with parental modeling of anxious behaviors. More specifically, participants were asked to respond to eight positive and negative reinforcement items (e.g., "Did he/she allow him/herself pleasant activities such as listening to music, reading, or special food?"). Response choices ranged from 0 (Never) to 3 (Often, more than 6 times a year). Eight verbal transmission items were also asked (e.g., "Did he/she act as if he/she was dangerously ill?"). Lastly, four questions concerning punishment related to the observed consequences of parental anxiety symptom displays and complaints were asked (e.g., "Were other people unsympathetic?"; Did other people make him/her feel responsible for having caused him/her symptoms?"). These twenty items comprised the Modeling/Anxiety scale, with possible scores ranging from 0 to 60 (See Appendix A). The LHQ

has showed good psychometric properties both in previous research as well as the present study. For the current study as well as previous research (Watt et al., 1998), internal consistency for the Modeling/Anxiety scale was approximately .92.

Anxiety sensitivity index-3 (ASI-3; Taylor et al., 2007; Appendix B).

The ASI-3 is an 18-item version of the original ASI (Peterson & Heilbronner, 1987) and was used to measure anxiety sensitivity as a dependent variable in the current study (See Appendix B). The items in the ASI-3 fall into three scales assessing, 1) physical concerns (e.g., "When I feel a strong pain in my stomach, I worry it could be cancer"), 2) social concerns (e.g., "When I tremble in the presence of others, I fear what people might think of me"), and 3) cognitive/psychological concerns (e.g., "When I cannot keep my mind on a task, I worry that I might be going crazy"). Participants were provided a 5-point Likert scale (ranging from 0-"very little" to 4- "very much") and asked to rate the extent to which they agreed or disagreed with each item. The three scales were combined for a total ASI score, with possible scores ranging from 0 to 72. Higher scores indicate greater anxiety sensitivity. The current sample is congruent with an internal consistency of .93.

Interpersonal reactivity index (IRI; Davis, 1983, 1994; Appendix C).

The IRI is a 28-item self-report questionnaire that taps four separate aspects of empathy: Perspective-Taking (PT), Fantasy (FS), Empathic Concern (EC), and Personal Distress (PD) (Davis, 1980). Each scale consists of 7-items and provides responses ranging from 0-"Does not describe me well" to 4-"Describes me very well." The PT scale measures one's ability or tendency to put themselves in another's shoes in order to see things from their point of view. Sample questions found with this scale are, "I try to look at everybody's side of the disagreement before making a decision" and "I sometimes find it difficult to see things from the other guy's

point of view." The FS scale measures one's ability or tendency to adopt the feelings and behaviors of characters in books, television shows, movies, etc. regardless of whether or not they are fictitious. An example question targeting these tendencies is as follows: "After seeing a play or movie, I have felt as though I were one of the characters." The EC scale pertains to one's tendency to put themselves in another's shoes by experiencing feelings of compassion, warmth and concern for that person. Sample questions asked on this subscale are: "I am often quite touched by things I see happen"; "When I see someone being taken advantage of, I feel kind of protective of them." The Personal Distress scale measures common emotional reactions from a different perspective. Rather than ask the participant about their feelings of concern for others, they are asked about their own feelings of discomfort in reaction to the emotions another person is experiencing. A typical question on this scale is, "When I see someone who badly needs help in an emergency, I go to pieces" or "Being in a tense emotional situation scares me."

The IRI has good internal and test-retest reliabilities. The internal reliability reported for the IRI in previous research range from .71 to .77 (Davis, 1983). In the current sample, Cronbach's alpha is .78.

The hierarchical structure of the IRI was examined (Pulos, Elison & Lennon, 2004). Authors used hierarchical factor analysis with Schmid-Leizman orthagonalization to identify the second-order factor structure of the IRI. Results indicated that the Personal Distress scale was present in the second-order factor; therefore, it was removed from the first-order factors. The remaining three scales Perspective Taking, Fantasy and Empathic Concern comprise the first-order factors and will be the only scales calculated when scoring the IRI (See Appendix C). These subscales were combined to form a total composite score, with possible scores ranging from 0-84. This modified form of the IRI is used to measure the mediator variable, empathy in

the present research. The internal consistency for the composite score in the current study was .82.

Panic attack questionnaire, revised (PAQ-R; Cox, Norton & Swinson, 1992).

Students' histories with panic attacks were assessed using the PAQ-R (Cox et al., 1992). The PAQ-R is a self-report instrument designed to provide comprehensive quantitative and qualitative data regarding the specific features and symptoms of Panic disorder and Agoraphobia. The PAQ-R is divided into multiple sections each assessing different aspects of panic (psychopathology, treatment history, frequency of panic attacks, onset and duration of panic attacks, intensity of symptoms, anticipatory anxiety, interference, distress, and controllability). The internal consistency for the PAQ-R in previous research is .83 (Cox et al., 1992). For the purpose of the present study, only the frequency of panic attacks was analyzed and used as a dependent variable by asking participants, "how many panic attacks have you had in the past year?"

Beck anxiety inventory (BAI; Beck, Epstein, Brown & Steer, 1988).

The Beck Anxiety Inventory (BAI) is a 21-item self-report instrument designed to measure the severity of anxiety symptoms (Beck et al., 1988). Participants are given a list of common symptoms of anxiety and asked to indicate how much they have been bothered by each symptom within the last week (0-"not at all" to 3-"severely"). A total score was calculated, with possible scores ranging from 0 to 63. The composite score on the BAI was used to measure participants' overall anxiety (DV) in the current study. The BAI demonstrated good psychometric properties with internal consistency of $\alpha=.94$ in the present research. This is consistent with previous research (Beck et al., 1988)

Chapter 4

Results

Preliminary analyses.

Participants' responses were examined for patterns and problems in the data. Participants were given the option to indicate "I don't know" as a response on some of the items on the Panic Attack Questionnaire (PAQ) and the Learning Questionnaire (LHQ). However, only a portion of each measure was used for data analysis. The components of the PAQ and LHQ, used for the purpose of the current research, did not contain "I don't know" responses. Therefore, such responses had no effect on the current analyses. Participants were also given the option to respond "not applicable" to some items on the LHQ and PAQ. These items were assigned values of zero and used in all analyses. Variability in scores for both males and females was examined for all measures and determined to be good.

Next, mean scores and standard deviations were computed and are presented in Table 1. The current sample scored higher on the LHQ than published means for other Canadian, American, and German university students (Ehlers, 1993; Leen-Feldner et al., 2008; Watt et al., 1998). Study means for the IRI, ASI, and BAI were consistent with previous research (Ehlers, 1993; Leen-Feldner et al., 2008; Watt et al., 1998). Although the PAQ was administered in its entirety, in the current study only one question (i.e. How many panic attacks have you experienced in the past year?) was analyzed as this measure was utilized only to assess the frequency of panic attacks experienced by participants. Therefore means from the current sample could not be compared with PAQ means reported in previous research.

Independent samples *t*-tests were conducted to examine gender differences on major study variables (Table 1). In an effort to consistently report effect sizes as Pearson's *r*, effect sizes for all *t*-tests were converted from Cohen's *d* to Pearson's *r* using the following calculation:

$$r = \sqrt{(t^2 / t^2 + df)}.$$

Congruent with existing literature on empathy, women reported more empathy than men [*t* (434) = -3.96, *p* = .0001], with an effect size of *r* = .17. As hypothesized, women reported significantly higher scores of for panic [*t*(434) = 2.18, *p* = .03], with an effect size of *r* = .10 and anxiety [*t*(430) = -2.90, *p* = .004], with an effect size of *r*=.14. However, contrary to expectations, men and women did not report significantly different levels of anxiety sensitivity [*t(*429) = .72, *p* = .48]. Interestingly, women in this study reported significantly more vicarious learning experiences with panic than men [*t* (434) = -2.33, *p* = .02], with an effect size of *r* = .10.

Table 1
Means, Standard Deviations, and Independent Samples t Tests for Major Study Variables by Gender (N=436, women: n=329, men: n=107)

Variable	Men: Mean (SD)	Women: Mean (SD)	*t*
1. PAQ	.35 (1.43)	.70 (1.89)	-2.18*
2. ASI	12.14 (13.94)	13.18 (12.63)	-.72
3. BAI	5.26 (6.89)	8.39 (10.39)	-2.90***
4. IRI	50.72 (10.35)	55.11 (10.10)	-3.96***
5.Vicarious LE	3.02 (8.43)	5.69 (11.13)	-2.33*

*Note: *p<.05; ***p<.001;* PAQ = the number of panic attacks reported in the last year; ASI= total composite score of all anxiety sensitivity symptoms reported; BAI=total composite score general anxiety symptoms reported; IRI= total composite score of items on the perspective-taking, fantasy, and empathic concern scales. Vicarious LE= total composite score of all items pertaining to parental modeling of anxiety symptoms.

Correlations were computed for major study variables (Table 2). Correlations by gender are presented in Table 3. The correlation matrix showed that vicarious learning experiences (LHQ) was positively associated with the number of panic attacks reported in the last year (PAQ, *r* = .13), AS (ASI, *r* = .15), and overall anxiety (BAI, *r* = .14). Therefore, the mediated

moderation models for anxiety sensitivity, panic disorder, and anxiety were examined. Separate

regression analyses were run to test each of the models independently.

Table 2
Pearson's Correlations for Major Study Variables for the Entire Sample (N=436)

Variable	1	2	3	4	5
1. PAQ	---				
2. ASI	.31**	---			
3. BAI	.35**	.46**	---		
4. IRI	.16**	.09	.12*	---	
5. Vicarious LE	.13**	.15**	.14**	.06	---

*Note: * p<.05; ** p<.01;* PAQ = the number of panic attacks reported in the last year; ASI= total composite score of all anxiety sensitivity symptoms reported; BAI=total composite score general anxiety symptoms reported; IRI= total composite score of items on the perspective-taking, fantasy, and empathic concern scales; Vicarious LE= total composite score of all items pertaining to observed anxiety in a caregiver during childhood.

Table 3
Pearson's Correlations for Study Variables by Gender (N=436)

Variable	1	2	3	4	5
1. PAQ	---	.25**	.41**	.12	-.08
2. ASI	.32**	---	.28**	.04	.25*
3. BAI	.33**	.52**	---	.03	.10
4. IRI	.15**	.11	.11*	---	-.07
5. Vicarious LE	.15**	.12*	.13*	.07	---

Note: * p<.05; ** p<.0; [a] Correlations for females appear in the shaded area (*n*=329). [b] Correlations for males are not shaded (*n*=107). PAQ = the number of panic attacks reported in the last year; ASI= total composite score of all anxiety sensitivity symptoms reported; BAI=total composite score general anxiety symptoms reported; IRI= total composite score of items on the perspective-taking, fantasy, and empathic concern scales; Vicarious LE= total composite score of all items pertaining to observed anxiety in a caregiver during childhood.

Prior to conducting mediated moderation analyses, the distributions for the dependent

variables were examined for normality. All dependent variables were normally distributed, with

the exception of the panic attacks variable (PAQ). The skewness and kurtosis statistics for the

dependent variable (PAQ), frequency of panic attacks, was 3.90 and 16.85, respectively as 356

participants did not report experiencing a panic attack during the past year. Similar distribution

problems were identified for the independent variable, vicarious LE, as 329 participants did not

report having vicarious learning experiences. The skewness statistic for the vicarious LE variable

was 2.30 and the kurtosis statistic was 4.89. Efforts to transform the data were unsuccessful due to the specific nature of the distribution, with a very large proportion of zeros. Although the distribution for the vicarious LE variable was not normal, the skewness issues were less problematic given its function as a predictor variable. The steps taken to rectify distribution problems with the PAQ variable are discussed below.

Mediated moderation analyses.

First, the vicarious LE variable was centered around the sample mean. An interaction variable was created by multiplying the vicarious LE variable by gender; this was used as an IV. Then, anxiety sensitivity was regressed on vicarious LE, gender, and vicarious LE x gender. To test if the interaction was significant, the regression coefficient for the interaction term was examined. The test for the moderator effect was not significant (See Table 4 for regression coefficients). Thus, no further analyses on these variables were completed (See Figure 2 for standardized beta weights).

Next, BAI was regressed on vicarious LE, gender, and vicarious LE x gender. To test if the interaction was significant, the regression coefficient for the interaction term was examined. The test for the moderator effect was not significant (See Table 5 for regression coefficients). No further analyses on these variables were completed (See Figure 2 for standardized beta weights).

Due to the non-normally distributed nature of the panic attack variable, the frequency of panic attacks was not examined. Instead, the DV, frequency of panic attacks was transformed to a dichotomous variable (i.e. 0 = those who have not had panic attacks vs. 1= those who have) and used for the remainder of the analyses. The non-normally distributed vicarious LE variable was also transformed to a dichotomous variable (i.e. 0 = those who did not report a history of

vicarious learning experiences vs. 1= those who did) and used for the remainder of the analyses.

Gender and the dichotomized vicarious learning experiences variable were centered around the

sample mean. Then, an interaction variable was created by multiplying the dichotomous

vicarious learning experiences variable by gender; this was used as an IV. Next, binomial

logistic regression was employed due to the categorical nature of the dependent variable. The

dichotomous PAQ variable was regressed on vicarious LE, gender, and vicarious LE x gender.

To test if the interaction was significant, the regression coefficient for the interaction was

examined (See Table 6 for regression coefficients). The test for the moderator effect was not

statistically significant (See Figure 3). Linear regression predicting the number of panic attacks

for those who have had panic attacks was also conducted. Results were not significant ($p = .59$).

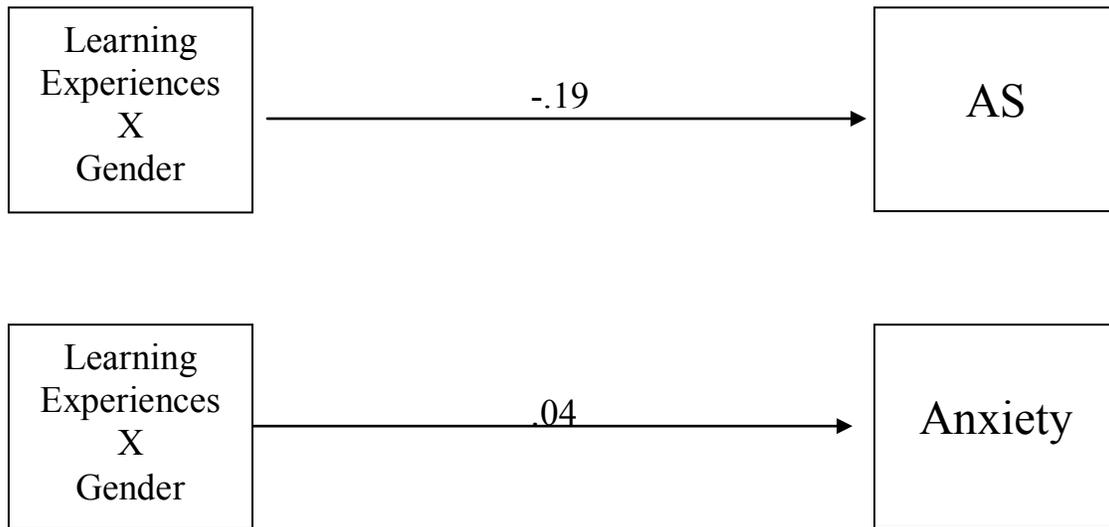| Learning Experiences X Gender | —-.19→ | AS |
| Learning Experiences X Gender | —.04→ | Anxiety |

Figure 2: Mediation model for empathy, using multiple regression. The two panels illustrate the c pathway without the mediator: pathway for each dependent variable. The panels report standardized beta weights using multiple regression.

Table 4

Summary of Multiple Regression Analysis for ASI (N=431)

Variable	B	SE B	β	t
(Constant)	13.05	0.62		20.96
Gender	0.15	1.47	0.01	0.10
Vicarious LE	0.20	0.06	0.17	3.35***
Vicarious LExGender	-0.25	0.16	-0.08	-1.54

*Note: *p<.05, ** p<.01 (two-tailed)*; ASI= total composite score of all items reported on the anxiety sensitivity index. Main effects for gender and vicarious LE (measured bythe LHQ) are also presented in the table above. Vicarious LE= total composite score of all items pertaining to observed anxiety in a caregiver during childhood. Vicarious LExGender= the interaction term.

$R^2=.03$

Table 5

Summary of Multiple Regression Analysis for BAI (N=432)

Variable	B	SE B	β	t
(Constant)	7.60	0.47		16.34
Gender	2.89	1.10	0.13	2.64**
Vicarious LE	0.11	0.05	0.18	2.39*
Vicarious LExGender	0.04	0.12	0.08	0.34

*Note: *p<.05, ** p<.01 (two-tailed)*; BAI= total composite score of all BAI items reported. Main effects for gender vicarious LE (measured by
the LHQ) are also presented in the table above.; Vicarious LE= total composite score of all items pertaining to observed anxiety in a caregiver during childhood. Vicarious LExGender= the interaction term.

$R^2=.03$

Logistic regression.

Although the logistic regression model did not find the interaction to be statistically significant, results did identify both gender (Exp(B) = 2.48, Wald F = 5.30, p = .02; with a 95% confidence interval (CI) of 1.14 - 5.37) and vicarious LE (Exp(B) = 2.08, Wald F = 4.58, p = .03; with a 95% CI of 1.06 - 4.07) to be significantly related to panic attacks (See Table 6). Results suggest that females were almost two and a half times more likely than males to report experiencing a panic attack in the last year. People with a vicarious learning experience, relative to those without, were twice as likely to report experiencing a panic attack in the last year (See Table 6). The estimated Nagelkerke R square effect size for the overall model was R^2 = .09.

Table 6

Logistic Regression Results for PAQ, With the Interaction Term (N=436)

Variable	B	Wald	Exp(B)	95% CI
(Constant)	-1.64	0.14	0.19	
Gender	0.91*	5.30	2.48	1.14-5.37
Vicarious LE	0.73*	4.58	2.08	1.06-4.07
Vicarious LExGender	1.52	1.82	4.59	.50-41.93

*Note: *$p<.05$ *(two-tailed);* Main effects for gender (0=Males, 1=Females) and vicarious LE (0=no vicarious learning history, 1=vicarious learning history) are presented in the table above. PAQ= panic attacks reported in the last year (0=no, 1=yes). Vicarious LExGender= the interaction term.

$R^2=.08$
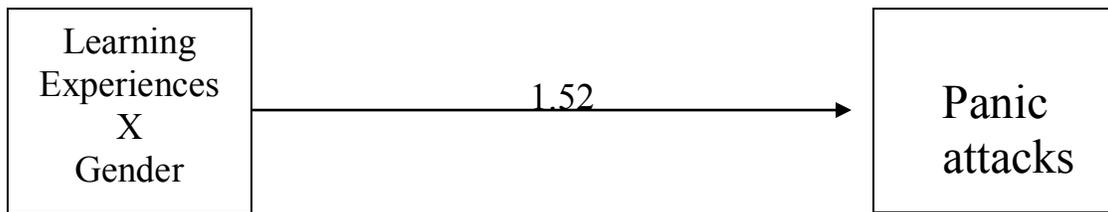
Figure 3. Predicted change for the interaction term, using a logistic regression model. The panel reports the predicted change in the log of the odds for a one unit change in the interaction term.

Exploratory analyses.

In order to better understand the relationship between panic attacks and the predictors, the raw regression coefficients were used to generate predicted probabilities for different kinds of participants. This was completed by examining the change in predicted probabilities for panic attacks associated with the one unit change in gender and vicarious learning experiences. To obtain this information, the logit of the predicted probability was calculated using a version of the following equation:

$$logit(p)= b_0+b_1(X_1)+b_2(X_2)+b_3(X_3).$$

For the model in Table 6, this translates into the following equation for the current dataset:

$$logit(panic\ attacks)= b_0+b_1(gender)+b_2(vicarious\ LE)+b_3(gender*vicarious\ LE).$$

This equation was calculated for males without reported learning experiences, males with reported learning experiences, females without reported learning experiences, and for females with reported learning experiences. In other words, participants could only belong to one of four groups. The values corresponding to each combination of predictors were entered into the equation to generate the four logits of the predicted probabilities.

Next, the logits were converted to probabilities for each of the four possible groups using a version of the following equation:

$$p = \frac{e^{b0+b1(X1)+b2(X2)+b3(X3)}}{(1+e^{b0+b1(X1)+b2(X2)+b3(X3)})}.$$

Results indicated that males who did not report a history of learning experiences had a 9.8% probability of experiencing panic attacks in the last year. For males who did report a learning history, the probability of experiencing panic attacks in the last year was 6.7% (See Table 7).

Table 7
Predicted Probability of Experiencing a Panic Attack in the Last Year (with the interaction term)

Gender	Without LE	With LE
Male	9.8%	6.7%
Female	15.9%	35.9%

Note: Without LE= participants without a reported history of vicarious learning experiences.
With LE= participants with a reported history of vicarious learning experiences.

The results above suggest that males in the current sample without a vicarious learning history are more likely to report experiencing panic attacks in the last year than males that reported a history of vicarious learning history. Examination of frequencies in the current sample show this to be counterintuitive as one of only15 males who reported a learning history

also reported experiencing panic attacks in the last year while only 10 males of the 92 who did not report a learning history also reported experiencing panic attacks in the last year.

A possible cause for the counterintuitive results was explored. It was speculated that the extremely lop-sided frequency of males who reported both learning experiences and panic in the study could be responsible for unanticipated results. Although the negative impact of obtaining data for only one male who reported both a positive history of learning experiences and panic attacks in the last year cannot be asserted, its contribution to the interaction as a sort of outlier was considered. Casewise diagnostics were employed in order to better understand the overall influence of the one male who reported both a positive history of learning and panic attacks in the last year on the model. Surprisingly, there were no cases where Cook's distance exceeded a value of 1. However, the one male who reported both a positive vicarious learning history and panic had an absolute value of DfBeta greater than 1. Therefore, it is known that the one male who reported both a positive vicarious learning history and panic attacks in the last year had a larger influence on the parameters of the regression model. For this reason, the interaction term was removed from the logistic regression model and rerun.

Results for the logistic regression model, without the interaction term, found gender (Exp(B) = 2.29, Wald $F = 5.17$, $p = .02$; with 95% CI of 1.12 - 4.66) and vicarious LE (Exp(B) = 2.63, Wald $F=13.37$, $p = .001$; with 95% CI of 1.57 - 4.42) to be even more significantly related to panic attacks than in the previous model (See Table 8). The estimated Nagelkerke R square effect size for the model was $R^2 = .08$.

Table 8

Logistic Regression Results for PAQ, Without the Interaction Term (N=436)

Variable	B	Wald	Exp(B)	95% CI
(Constant)	-2.46	51.92	0.85	
Gender	0.83*	5.17	2.29	1.12-4.66
Vicarious LE	0.97***	13.37	2.63	1.57-4.42

*Note: * p<05, ***p<.001 (two-tailed);* PAQ= panic attacks reported in the last year (0=no, 1=yes). Main effects for gender (0=Males, 1=Females) and vicarious LE (0=no vicarious learning history, 1=vicarious learning history) are presented in the table above.

$R^2=.08$

The predictive probabilities for all four groups were recalculated using the raw regression coefficients from the model without the interaction term. Although the probabilities changed only slightly, the results were more congruent with theory. Results indicated that females who did not report a history of learning experiences had a 16.3% probability of experiencing panic attacks in the last year. For females who did report a learning history, the probability of experiencing panic attacks in the last year was 33.9%. Results indicated that males who did not report a history of learning experiences had a 7.8% probability of experiencing panic attacks in the last year. For males who did report a learning history, the probability of experiencing panic attacks in the last year was 18.3% (See Table 9).

Further analysis to examine if males and females with a positive learning history differed significantly on reported panic was conducted. For these analyses of simple effects, only participants who reported a positive vicarious learning history were included in the analysis. Then, the DV panic attacks, was regressed on gender. Results for the logistic regression model, found marginally significant gender differences (Exp(B) = 7.83, Wald F = 3.79, p = .052; with 95% CI of .99 - 62.24). In other words, there was a marginally significant difference on panic attacks between males and females in the current study. It was speculated that this gender difference would be more significant if there were more males in the current sample.

Table 9

Predicted Probability of Experiencing a Panic Attack in the Last Year (without the interaction term)

Gender	Without LE	With LE
Male	7.8%	18.3%
Female	16.3%	33.9%

Note: Without LE= participants without a reported history of vicarious learning experiences.
With LE= participants with a reported history of vicarious learning experiences.

Predicted probability of experiencing a panic attack in the past year
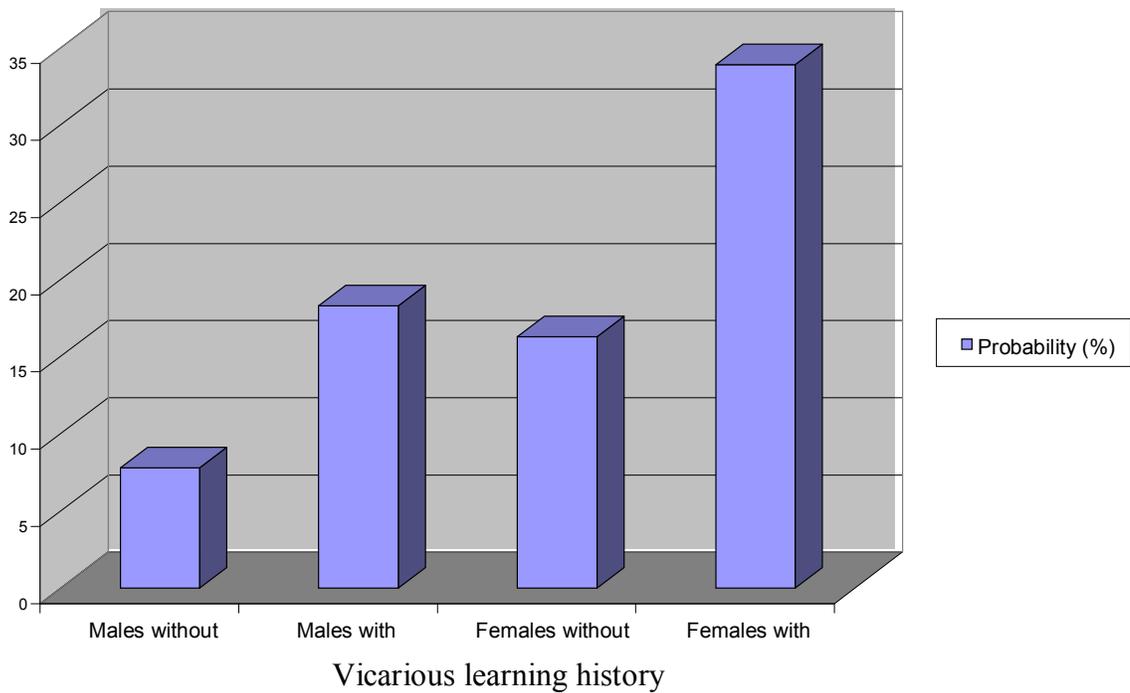

Vicarious learning history

Figure 4: Predicted probability of experiencing a panic attack in the last year. The figure illustrates the probability, in percentage, of experiencing panic in the past year for the four groups of participants.

Chapter 5

Discussion

Previous research has found both heritability and intergenerational behavioral transmission to be related to anxiety disorders. Intuitively, it would appear likely that a child with an anxious parent would learn and be reinforced by the parent's anxious tendencies. Although previous research has found this to be true (e.g. Ehlers, 1993; Muris, 1996; Watt et al., 1998), to date, the more robust findings have been found in studies of instrumental learning and verbal transmission of information from parent to child. Attempts at linking vicarious learning to anxiety, panic and anxiety sensitivity have been unsuccessful.

This study was designed to answer three research questions: 1) do women report significantly higher levels of general anxiety, anxiety sensitivity, and more panic, 2) does gender moderate the relationship between vicarious learning experiences and panic attacks, and 3) is this moderated relationship mediated by empathy? The results of this study provide partial support for research question #1, as females reported significantly more general anxiety and panic compared to males. However, the current study did not find significant gender differences in reported anxiety sensitivity. The failure to detect gender differences in anxiety sensitivity may be related to the conflicting results pertaining to anxiety sensitivity in previous literature. Results of research using total composite scores for anxiety sensitivity have been contradictory (Foot & Koszycki, 2004; Van Beek & Griez, 2003). Gender differences are more reliably detected when using only the Physical Concerns scale to measure anxiety sensitivity (Foot & Koszycki, 2004; Van Beek & Griez, 2003). Speculations in previous research attribute the gender differences on the Physical Concerns subscale to possible differences in the severity of somatic symptoms experienced by women with panic disorder than men with panic disorder.

36

The thought is that women with panic disorder report greater physical concern because they experience more intense somatic symptoms. It should be noted, however, that these speculations pertain only to studies that compare anxiety sensitivity in clinical versus non-clinical samples.

The second objective of this study was to extend previous research by examining the relationship between vicarious learning experiences and panic attacks, anxiety, and anxiety sensitivity (research question #2). The results of this study did not find gender to moderate the relationship between vicarious learning experiences and general anxiety, anxiety sensitivity or panic attacks. Because the moderated relationship between vicarious learning experiences and general anxiety, anxiety sensitivity, and panic attacks was not found, research question #3 could not be answered.

Although only the first research question was answered as anticipated, some unexpected results were also found. In particular, the logistic regression results suggest that both gender and vicarious learning experiences are related to reports of experiencing panic attacks in the past year. Although the relationship with gender is not entirely surprising, the finding that vicarious learning experiences, alone, increase the likelihood of having panic attacks is novel. Moreover, the likelihood is increased by more than two and half times. The present finding has not been found in previous research (Elhers, 1993) and suggests that vicarious learning experiences do, in fact, play an integral role in the onset of panic attacks. A possible explanation for the discovery of a significant relationship between vicarious learning experiences and panic attacks in the current study is the nature of the vicarious learning experience used for analysis. Prior research used a continuous variable that measured many different vicarious experiences and frequency of the vicarious experiences. In the current study, the nature of the variable was dichotomous (i.e. they reported a positive history of vicarious learning experiences or they did not). It may have

been that by measuring and including frequency of vicarious learning experiences in past research, unnecessary noise was created. Ultimately, the noise may have masked a significant relationship between vicarious learning experiences and panic.

Further efforts to learn more about the relationship between vicarious learning experiences and panic uncovered a marginally significant trend. Exploratory analyses found marginally significant gender differences in the probability of experiencing panic attacks when there is a positive vicarious learning history. Specifically, females with a positive vicarious learning history have a higher predicted probability of experiencing panic attacks than males with a positive vicarious learning history. It is possible that these marginally significant differences might be related to the gender differences in vicarious learning found in the current study, with women reporting more panic-related experiences. These gender differences could be explained by previous experimental research that found gender differences in reported distress and dislike to an observational fear procedure (Kelly & Forsyth, 2007). In that study, females not only reported higher distress during the procedure, but also for a prolonged period of time after the observational fear procedure had ended. In other words, although males and females in that study experienced the same procedure, females found it to be significantly more distressing than males. This suggests a possible explanation for why women in the current study reported significantly more vicarious experiences than men: a learning experience associated with higher perceived distress and dislike is likely to be retrieved from memory more easily than experience with less perceived distress and dislike. Gender differences in distress at the time of the vicarious learning experiences may also account for why it is that females are more likely to develop or report panic in the future.

Substantiation of gender differences in vicarious learning is particularly relevant given the reported prevalence of panic disorder in women. More specifically, it suggests that there are specific factors pertaining to learning that are different for males and females. Females in a previous study reported experiencing greater distress to a simulated panic attack when the model is female (Kelly & Forsyth, 2007). This may suggest that, although men and women encounter similar experiences, women are more sensitive or attuned to the panic symptoms experienced by their mother. This research, paired with findings that suggest females are more susceptible to experiencing panic symptoms, illustrate how a cycle of panic in females could be maintained across generations.

Limitations.

Preliminary analyses determined that not all assumptions for regression were met. The skewness problems with the vicarious learning history and panic attack variables necessitated using logistic regression instead of multiple regression. Because of this, the variability in scores on vicarious learning history and panic attacks was lost due to dichotomization.

Another limitation of the present study pertains to the nature of data collection. Retrospective reports were used to collect data on complicated experiences that may have occurred many years ago. This may have prevented fine distinctions in the frequency and severity of symptomatology, recollection of experiences, and cognitive and physical distress to be accurately recalled by participants. Additionally, the current study was not able to validate reports by collecting parent self report data in addition to participant self report data. Inaccuracies in retrospective reporting may have attenuated any effects. In summary, measuring the relationships between vicarious learning experiences, anxiety sensitivity, panic attacks, and anxiety with retrospective reports may be affecting the ability to detect a significant relationship.

Lastly, gender was not equally distributed. Although this is not an unusual occurrence in clinical research, it may have been particularly problematic in the present study because the research questions pertained specifically to gender differences in the relationship between vicarious learning experiences and general anxiety, anxiety sensitivity, and panic attacks. Specifically, the interaction between vicarious learning experiences and gender may have been affected by the low number of males in the current study.

Implications and future directions.

The present study should be regarded as exploratory and the results need further investigation. Future research should replicate this study with a sample that includes a more even distribution of males and females. It is also recommended that vicarious learning experiences be measured dichotomously (i.e. either positive or negative history with vicarious learning experiences) to ensure that noise created by measuring the frequency of such experiences does not interfere with results. It may be difficult to measure the frequency of panic attacks without encountering similar distributions issues that were problematic in the current study; however, categorizing the panic attacks variable into "none," "some," and "many" may reduce skewness without entirely losing the variability.

Given that previous research has demonstrated gender differences in reported physical concerns pertaining to anxiety sensitivity (Foot & Koszycki, 2004; Van Beek & Griez, 2003), future research may find it useful to use only the Physical Concerns subscale of the ASI to measure anxiety sensitivity.

Conclusions.

 In conclusion, this study examined the relationship between vicarious learning experiences and general anxiety, anxiety sensitivity, and panic attacks with the expectation of

finding significant gender differences in these relationships. Results indicated that there are significant gender differences in reported anxiety, panic, empathy and vicarious learning experiences. Moreover, the current study found that participants who reported a positive learning history had a higher predicted probability of experiencing panic, with women demonstrating the highest likelihood at 33.9%. Although the mediation model in this study was not supported, the directions of the pathways were consistent with what was expected. However, the magnitude of the effects were not large enough to detect a significant relationship. This suggests that further replication and extension would be worthwhile.

Further investigation of possible factors responsible for the gender differences pertaining to the onset and etiology of anxiety disorders needs to be done in order to better understand anxiety. Once the mechanisms responsible for the development of panic disorder are identified, preventive interventions can be offered to those indirectly affected by and therefore at increased risk for the disorder.

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Appendix A

Before you were 18, did your father or mother (or others with whom you lived) suffer from symptoms such as pains, lumps, racing heartbeat, stomach problems, nausea, dizziness, difficulty breathing, tiredness, or other unusual symptoms?

If yes, who?

_____

(specify relationship to you)

Which symptom(s)? (please list)

_____

_____

If someone in your household experienced these symptoms please answer the following questions. If nobody in your household experienced the symptoms, please continue with Part 3.

	Never	Seldom (1-2x/yr)	Occasionally (3-6x/yr)	Often (6+)

When this person had these symptoms...

	Never	Seldom	Occasionally	Often
1. ... did he/she stay home from work or he/she cut back on household chores?	0	1	2	3
2. ... did he/she expect you or other family members to help out with household chores more than usual?	0	1	2	3
3. ... did he/she cancel social activities he/she had planned with the family or friends?	0	1	2	3
4. ... did he/she cut back on physical activities such as sports?	0	1	2	3
5. ... did he/she expect the family to show consideration for him/her?	0	1	2	3
6. did he/she expect the family to understand that he/she was irritable or more easily hurt emotionally because of the symptoms?	0	1	2	3

7. ... did he/she allow him/herself pleasant activities

such as listening to music, reading or special food?	0	1	2	3
8. ... did he/she worry about his/her symptoms?	0	1	2	3
9. ... did he/she take medication?	0	1	2	3
10. ... did he/she see a doctor?	0	1	2	3
11. ... did he/she think the worst?	0	1	2	3
12. ...did he/she appear frightened?	0	1	2	3
13. ...did he/she act as if he/she was dangerously ill?	0	1	2	3
14. ... did he/she behave as if the symptoms could get worse and run out of control?	0	1	2	3
15. ... did he/she think the symptoms were more serious than they turned out to be?	0	1	2	3
16. ... did he/she repeatedly seek reassurance?	0	1	2	3
17. ... did other people make him/her feel responsible for having caused his/her symptoms?	0	1	2	3
18. ... did other people think his/her symptoms were less serious than they really were?	0	1	2	3
19. . were other people unsympathetic?	0	1	2	3
20. .. did he/she feel left alone?	0	1	2	3

Appendix B

ASI-3

Please circle the number that best corresponds to how much you agree with each item. If any items concern something that you have never experienced (e.g., fainting in public), then answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience. Be careful to circle only one number for each item and please answer all items.

	Very little	A little	Some	Much	Very much
1. It is important for me not to appear nervous.	0	1	2	3	4
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3. It scares me when my heart beats rapidly.	0	1	2	3	4
4. When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
5. It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
6. When I tremble in the presence of others, I fear what people might think of me.	0	1	2	3	4
7. When my chest feels tight, I get scared that I won't be able to breathe properly.	0	1	2	3	4
8. When I feel pain in my chest, I worry that I'm going to have a heart attack.	0	1	2	3	4
9. I worry that other people will notice my anxiety.	0	1	2	3	4
10. When I feel "spacey" or spaced out I worry that I may be mentally ill.	0	1	2	3	4
11. It scares me when I blush in front of people.	0	1	2	3	4
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.	0	1	2	3	4
13. When I begin to sweat in a social situation, I fear people will think negatively of me.	0	1	2	3	4
14. When my thoughts seem to speed up, I worry that I might be going crazy.	0	1	2	3	4
15. When my throat feels tight, I worry that I could choke to death.	0	1	2	3	4
16. When I have trouble thinking clearly, I worry that there is something wrong with me.	0	1	2	3	4
17. I think it would be horrible for me to faint in public.	0	1	2	3	4
18. When my mind goes blank, I worry there is something terribly wrong with me.	0	1	2	3	4

Scoring: Physical concerns = sum of items 3, 4, 7, 8, 12, 15. Cognitive concerns = sum of items 2, 5, 10, 14, 16, 18. Social concerns = sum of items 1, 6, 9, 11, 13, 17.

Appendix C

INTERPERSONAL REACTIVITY INDEX

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: A, B, C, D, or E. When you have decided on your answer, fill in the letter on the answer sheet next to the item number. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can. Thank you.

ANSWER SCALE:

0	1	2	3	4
DOES NOT DESCRIBE ME WELL				DESCRIBES ME VERY WELL

1. I daydream and fantasize, with some regularity, about things that might happen to me. (FS)

2. I often have tender, concerned feelings for people less fortunate than me. (EC)

3. I sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)

4. Sometimes I don't feel very sorry for other people when they are having problems. (EC) (-)

5. I really get involved with the feelings of the characters in a novel. (FS)

6. In emergency situations, I feel apprehensive and ill-at-ease. (PD)

7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. (FS) (-)

8. I try to look at everybody's side of a disagreement before I make a decision. (PT)

9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC)

10. I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)

11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT)

12. Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)

13. When I see someone get hurt, I tend to remain calm. (PD) (-)

14. Other people's misfortunes do not usually disturb me a great deal. (EC) (-)

15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (PT) (-)

16. After seeing a play or movie, I have felt as though I were one of the characters. (FS)

17. Being in a tense emotional situation scares me. (PD)

18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.
     (EC) (-)

19. I am usually pretty effective in dealing with emergencies.(PD)(-)

20. I am often quite touched by things that I see happen. (EC)

21. I believe that there are two sides to every question and try to look at them both. (PT)

22. I would describe myself as a pretty soft-hearted person. (EC)

23. When I watch a good movie, I can very easily put myself in the place of a leading
     character. (FS)

24. I tend to lose control during emergencies. (PD)

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (PT)

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.
     (FS)

27. When I see someone who badly needs help in an emergency, I
go to pieces. (PANIC DISORDER)

28. Before criticizing somebody, I try to imagine how I would feel if
I were in their place. (PT)

NOTE:(-) denotes item to be scored in reverse fashion
           PT = perspective-taking scale
           FS = fantasy scale
           EC = empathic concern scale
           PANIC DISORDER = personal distress scale