The Role of Anxiety Sensitivity in the Co-Morbid Experiencing of Chronic Pain and

Posttraumatic stress disorder

By

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## Dissertation

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### Abstract

Currently there are two theories as to the role of anxiety sensitivity in the comorbid experiencing of chronic pain and PTSD in veterans. The first theory is that of mutual maintenance which proposed seven different avenues through which PTSD and chronic pain serve to maintain each other. One of the avenues involves the role of anxiety sensitivity. The anxiety symptoms associated with anxiety sensitivity are misinterpreted as indicative of harm, which could lead to a misinterpretation of the physical sensations associated with pain. The second theory which pertains to the comorbidity of PTSD and chronic pain is the shared vulnerability theory. This theory postulates that PTSD and chronic pain tend to co-occur due to an underlying shared vulnerability for the two diagnoses. As in the mutual maintenance theory, the shared vulnerability theory also implicates anxiety sensitivity as playing a role in the comorbidity between the two disorders. To date, only one previous study has examined the role of anxiety sensitivity in the comorbid experiencing of PTSD and pain; that study found that both depression and anxiety sensitivity accounted for significant amounts of variability scores for both PTSD and pain. Results of the current study, utilizing Baron and Kenny's mediational model found that anxiety sensitivity impacted the experiencing of the effects of pain on daily functioning and PTSD, even when depression was utilized as a control variable. The current study failed to find a relationship between anxiety sensitivity and the experiencing of the effects of pain on daily living or the effects of pain on significant other relationships.

Keywords: anxiety sensitivity, veterans, mutual maintenance theory, PTSD, pain

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### **Chapter 1: Overview**

Soldiers who have served in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) have been faced with the possibility of death on a daily basis. These soldiers have seen comrades killed, they have been forced to kill or wound individuals, and/or they have been asked to stay on duty for extended periods of time (National Center for PTSD, 2007). Data collected between 2002 and 2009 found that during that period of time, 1 million troops left active duty and became eligible for Veterans Health Administration (VHA) benefits. Of those who had recently left active duty, 46% applied for services. Of the 46% who applied for services, 48% were diagnosed with a mental health problem (National Center for PTSD, 2011). During the 2010 fiscal year, the VHA spent 2 billion dollars to treat veterans who had been involved in overseas contingency operations. In comparison, the VHA spent 48 million dollars on healthcare costs for veterans of all other eras and conflicts. As of September 2011, mental health diagnoses were the second largest diagnostic category treated by the VHA. Of the mental health disorders diagnosed by the VHA, Posttraumatic Stress Disorder (PTSD) made up 52%. The cost of treating a veteran with PTSD was \$8300 compared to the cost of treating a veteran without PTSD was \$2400 per year (Veterans Health Administration, 2012). Compounding the fact that many military personnel have returned from service with a mental health diagnosis is the fact that many of these veterans have also returned with a diagnosis of chronic pain (Paltsev, Torgashov, Voronova, Bayandina, & Lunyakina, 2010).

Two theories have been proposed to explain the common co-morbidity of PTSD and chronic pain. The first of the two theories was put forth by Sharp and Harvey (2001). They proposed the theory of mutual maintenance in which they outlined and defined seven different avenues through which pain and PTSD might co-occur. Of importance to the current study, one

of those avenues was through the construct of anxiety sensitivity. Anxiety sensitivity was described as the misinterpretation of anxiety symptoms as indicative of harm. The misinterpreting of anxiety symptoms, according to the mutual maintenance theory, may then lead to the misinterpretation of physical symptoms involved in the experiencing of pain (McFarlane, Atchinson, Rafalowicz, & Papay, 1987). The second theory about the role that anxiety sensitivity may play a role in the co-morbid experiencing of PTSD and chronic pain was proposed by Asmundson and colleagues (2002). They introduced the shared vulnerability theory which posited that although other possible connections between PTSD and pain had been advanced in the literature, the most fruitful was anxiety sensitivity.

To date, only one study has empirically tested the role of anxiety sensitivity in the connection between PTSD and pain. Jackupcak and colleagues (2006) studied forty-five male veterans who were seeking inpatient care for PTSD and chronic pain symptoms. That study found that anxiety sensitivity and depression severity did play a role in the relationship between PTSD and pain. The researchers posited that PTSD influenced pain through underlying symptoms of anxiety sensitivity and depression. The current study will differ from that done by Jackupcak and colleagues by using depression as a control variable, to determine the extent to which anxiety sensitivity is affecting the experiencing of both Pain and PTSD.

### PTSD

### History

PTSD was introduced as a separate diagnostic category in 1980 with the release of the third edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-III). By DSM-III standards a diagnosis of PTSD could only be given if an individual had experienced a stressor that was outside the realm of everyday experience. The developers of the original diagnostic

criteria had in mind events such as war, torture, rape, etc., when they were defining what type of trauma could be associated with a PTSD diagnosis. The original developers believed that common life stressors such as divorce, failure, rejection, etc., should be classified as adjustment disorders. The diagnostic criteria for PTSD have been updated with every subsequent addition of the DSM.

### **Diagnosing PTSD**

According to the DSM-IV, the development of posttraumatic stress disorder (PTSD) is characterized by the advent of symptoms following a traumatic event involving immediate danger, threat of danger, or hearing about danger to oneself or another. Further, the response to the threat must involve the feeling of helplessness or horror (American Psychological Association, 2000). Symptoms of PTSD may include intrusive thoughts or nightmares, avoidance of people, places, or things that may cause re-experiencing, along with heightened startle responses, poor sleep, and in some cases anger (American Psychological Association, 2000). In the general population of the United States, the estimated lifetime prevalence of PTSD is 6.8% (Kessler, Bergland, Demler, & Walters, 2005). Individuals who are engaged in military combat are 13% (7.68%) more likely to be exposed to a traumatic event and subsequently develop PTSD (Seal, Bertenthal, Miner, Sen, & Marmar, 2007). The present study focused on the effects of PTSD as they pertain to military veterans.

### PTSD in DSM-5

Most of the criteria for PTSD as stated above remain the same in the DSM-5, although some minor changes were made. The diagnosis of PTSD was moved from the category of anxiety disorders to the new category of trauma and stress related disorders. Another change in the DSM-5 involves dividing the three clusters of symptoms into four clusters. The DSM-5 has added that PTSD can develop from hearing an account of a close friend or relative's trauma

experience. The criterion of avoidance and numbing was divided into two separate criteria, avoidance and negative alterations in cognitions and mood. Alterations in arousal and reactivity were added as a symptom category. These symptoms may be evidenced by reckless or destructive behavior. Criterion A2, requiring fear, helplessness, or horror right after the trauma, was deleted because they were not shown to be helpful in forming a diagnosis. The final change between DSM-IV and DSM-5 is the addition of a PTSD subtype labeled Dissociative PTSD. A diagnosis of Dissociative PTSD would be given if a person were experiencing PTSD with added symptoms of disassociation and derealization (Highlights of Changes from DSM-IV-TR to DSM-5, 2013). The current review of the literature has been based solely on DSM-IV criteria due to the fact that DSM-5 has only recently been released. As there are only minor variations in the diagnostic criteria between DSM-IV and DSM-5 the information from the studies represented should remain applicable. The next section covers chronic pain in relation to veterans with PTSD.

### **Chronic Pain**

Chronic pain, for the purposes of the current study, can be described as pain that lasts longer than three months and was initially accompanied by an illness or accident that may have healed (IASP, 1994). Chronic pain is not a minor problem in the U.S. According to at least one estimate, 116 million Americans are affected by chronic pain. Including direct medical costs and reduced worker productivity, the monetary toll of chronic pain can reach over 600 billion dollars annually (Care and Education Committee on Advancing Pain Research, 2011). Information collected from the Veteran's Affairs (VA) Healthcare System found that 50% of veterans who come for treatment experience chronic pain regularly (Kerns, Otis, Rosenberg, & Reid, 2003).

### **Chronic Pain and Mental Health Disorders**

Helmer and colleagues (2009) conducted a study with the aim of describing the associations among pain, mental health concerns, and function in veterans of Operations Enduring and Iraqi Freedom (OEF/OIF). The data were collected retrospectively from selfreported, standardized clinical intake surveys. The participants were 429 veterans of OEF/OIF who presented for clinical evaluation at a multidisciplinary deployment health clinic at a Veteran's Affairs (VA) medical center. For the collected sample of veterans, the majority reported good or better general health, chronic widespread pain was common and led to poorer physical role function, independent of comorbid mental health conditions (Helmer et al., 2009).

### **Chronic Pain in DSM-5**

Whereas the DSM-IV criteria for pain breaks the experience into distinct parts, such as psychologically based, illness based or injury based, the DSM-5 purports that all pain has some psychological basis and that most people who experience pain attribute it to a combination of factors rather than to one distinct cause. Using the DSM-5, clinicians would base their pain diagnoses on the specific symptoms their client were experiencing. For example, some might be diagnosed with somatic symptom disorder, some with psychological factors affecting another medical condition, and some pain symptoms may be accounted for by an adjustment disorder. By not putting everyone with pain in the same category, the DSM-5 will make more targeted treatment possible (APA, 2013). As the DSM-5 has just been released, the current literature review is based on DSM-IV-TR criteria for pain. In the next section anxiety sensitivity is defined and discussed.

### **Anxiety Sensitivity**

### **Defining Anxiety Sensitivity**

The concept of anxiety sensitivity dates back to the time in which Freud was practicing psychiatry. In 1985, Reis and McNally updated the concept of fear of fear by dividing it into two separate processes; these processes were labeled anxiety expectancy and anxiety sensitivity (Reis & McNally, 1985; Reis, Peterson, Gursky, & McNally, 1986). For the purpose of this study, the focus was on the concept of anxiety sensitivity. According to Reiss, anxiety sensitivity has its roots in the genes that render anxiety unpleasant and in individuals' beliefs about the personal consequences of experiencing anxiety. Reiss (2001) gives the example of a person experiencing the increase in heart rate associated with anxiety as being a sign of an impending heart attack. There are several reasons why a person might experience increased anxiety sensitivity. If a person has had a panic attack in the past it could lead to them having a higher level of anxiety sensitivity due to the fear-provoking symptoms associated with panic (Reis, Peterson, Gursky, & McNally, 1986). Goldstein and Chambless (1978), whose work on the concept of fear of fear laid the groundwork for Reis and McNally's work, proposed that fear of fear could only be developed after one had experienced panic. Reis and colleagues (1986) also believed that fear of fear could be developed after experiencing a panic attack, but they further believed that fear of fear could occur as the result of conditioning. To use the example put forth by Reis and colleagues, a child whose parents always taught him to maintain a certain appearance might grow to avoid certain situations that could lead to anxious perspiring (Reis, Peterson, Gursky, & McNally, 1986). In this example, the child would be more anxious about the result of his anxiety (perspiration on his shirt) than the actual anxiety producing situation (talking in front of a group).

### Anxiety Sensitivity as a Significant Fear

Building upon their previous research on anxiety sensitivity, Reiss and colleagues sought to demonstrate that anxiety sensitivity was not just another type of fear, but one with significance. In their article, Reis and colleagues gave an example that involved determining the relationship between three types of fear, fear of heights, fear of spiders, and anxiety sensitivity. Logically, one could say that fear of heights has nothing to do with fear of spiders, for example, but anxiety sensitivity could be linked to fear of heights and spiders. In other words, if one fears anxiety, then they could also fear any number of other anxiety provoking stimuli.

In the first part of the study by Reis et al., the factor validity of the fear of anxiety was evaluated. In the second part, the suggestion that anxiety sensitivity is related to fearfulness was re-tested under conditions that controlled for the general tendency of any one fear to predict another. The first part of the study confirmed that anxiety sensitivity was not just another type of fear, but one that had characteristics that were not common to other fears. The second part of the study found that the tendency for people who have one type of fear to also have other types of fears is much more common than previous psychological models of fear have suggested (Reiss, Peterson, & Gursky, 1986). In the next section, depression is defined and discussed.

### Depression

#### **Diagnostic Criteria for Depression**

In the DSM-IV-TR depression can be broken down into two categories based upon the degree of symptomology. A major depressive episode is characterized by a period of least two-weeks when a person shows a loss of interest or pleasure in nearly all activities that were once pleasurable; they must have experienced one or more major depressive episodes without a history of manic, mixed, or hypomanic episodes (DSM-IV-TR, 2004).

**Depression and posttraumatic stress disorder.** The experiencing of co-morbid PTSD and depression have been associated with negative outcomes in both physical and mental health in combat veterans who have served in Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF). Pittman and colleagues (2012) conducted a study to find out if depression and PTSD would each significantly impact health-related quality of life in veterans, even when they controlled for overlapping symptoms such as anhedonia, concentration, and insomnia. The participants in the study were 220 OEF/OIF veterans. The authors found that both depression and PTSD had a significant impact on veteran's mental health related quality of life, but the main-effect was not found for veteran's physical-health related quality of life (Pittman, Goldsmith, Lemmer, Kilmer, & Baker, 2012).

**Depression and Chronic Pain.** In clinical settings depression and chronic pain have been noted as co-occurring disorders. Banks and Kerns (1996) conducted a study to look at the connection. As a part of their study, the authors looked at the literature on depression and many other chronic medical conditions. Their findings indicated that depression was more prevalent among chronic pain patients than those patients who were suffering from other chronic medical conditions. Based on the findings of their review of the literature, the authors suggested a diathesis-stress framework as a way of understanding the connection between depression and chronic pain. As a part of this model, pain was linked directly with negative affect and negative cognition, thus making pain more likely to be linked with depressive symptoms (Banks & Kerns, 1996).

### Anxiety Sensitivity and Comorbid Chronic Pain and PTSD

### **Mutual Maintenance Theory**

Based on the idea that pain and PTSD are not mutually exclusive, Sharp and Harvey (2001) proposed the theory of mutual maintenance as a way of describing the connection between the two diagnoses. They put forth seven different avenues through which mutual maintenance may occur. Of importance to the current study, they suggested that anxiety sensitivity might be a possible link between pain and PTSD. Anxiety sensitivity involves misinterpreting anxiety symptoms as indicative of harm; this may lead to a misinterpretation of physical sensations involved in pain (McFarlane, Atchison, Rafalowicz, & Papay, 1987). This theory incorporates the cognitive, affective, and behavioral components of chronic pain which may serve to exacerbate the symptoms of PTSD.

### **Shared Vulnerability Theory**

The second prominent theory about pain and PTSD often co-occuring was offered by Asmundson and colleagues (2002). They proposed that those who are diagnosed with PTSD and pain have a shared vulnerability for the two disorders. Although other factors had been put forth to explain the connection, anxiety sensitivity has proven to be the most fruitful (Asmundson, Coons, Taylor, & Katz, 2002). Anxiety sensitivity involves the fear of anxiety symptoms based on the fact that the symptoms themselves may have harmful consequences (Asmundson, Coons, Taylor, & Katz, 2002; Reis & McNally, 1985; Taylor, 1999). Research has uncovered three dimensions of anxiety sensitivity, including fear of having an anxiety reaction in public, fear of losing control of thoughts, and fear of painful sensations around the experiencing of anxiety (Taylor, 1999).

### Hypothesis

A previous study done by Jakupcak and colleagues (2006) tested the role of anxiety sensitivity and depression in the comorbid experiencing of PTSD and chronic pain. The Jakupcak study found that anxiety sensitivity and depression severity do play a part in the relationship between veterans' experiencing of PTSD and pain, which the authors suggest means that PTSD influences pain through underlying symptoms of anxiety sensitivity and depression. The current study differs from Jackupcak's study in that depression was used as a control variable. The goal of the current study was to discern the impact of anxiety sensitivity on PTSD and pain when depression was controlled for. The following research question and hypothesis was proposed: *Does anxiety sensitivity have a significant effect on the comorbid experiencing of pain and PTSD when depression is controlled for? It was hypothesized that, even when depression was controlled for, anxiety sensitivity would significantly impact the comorbid experiencing of pain and PTSD.* 

### Methods

### Participants

Participants were current and former United States military personnel who self-reported symptoms of PTSD and chronic pain.

### Measures

Respondents completed five measures. The measures included: a Demographic questionnaire, Anxiety Sensitivity Index-3 (ASI-3), Beck Depression Inventory-II (BDI-II), the Posttraumatic Stress Disorder Checklist- Military Version (PCL-M), and the West Haven-Yale Multidimensional Pain Inventory (WHYMPI).

The Demographic Questionnaire is a 7-item form that assessed the participant's age, gender, ethnicity, branch of service, years in service, number of deployments, and involvement in combat. The ASI-3 is a psychometrically sound, 18-item scale made up of three parts measuring physical, cognitive, and social concerns (Taylor et al., 2007). The BDI-II is a psychometrically sound 21-item self-report measure that assessed symptoms of depression experienced during the past week (Beck, Steer, & Brown, 1996). The PCL-M is a psychometrically sound, 17- item inventory used to assess the specific symptoms of PTSD. The WHYMPI is a 52-item inventory made up of three subscales. The first part of the WHYMPI measures five important parts of the pain experience, including patients' perception of pain's interference in various areas of their functioning, support and concern from significant others, pain severity, self-control, and negative mood. The second part of the WHYMPI measures the response of significant others to communications about chronic pain including perceived frequency of punishing, solicitous, and distracting responses. The final part of the WHYMPI evaluates the patients' reports of their participation in four categories of daily activities including household chores, outdoor work, activities away from home, and social activities (Kerns, Turk, & Rudy, 1985). The participants completed measures consisting of 86 items.

#### Procedure

Recruitment was conducted among various veterans' organizations outside of the VA medical system. Among the organizations contacted were, the Virginia Employment Commission Veteran's Representative, the Wounded Warrior Project, Radford University Military Resource Center, and various VFW posts across Southwest Virginia and Northeast Tennessee. Along with phone and in-person recruiting, social media were also utilized to recruit participants for the study. As the population in the current study was difficult to access, chain

sampling, a technique that has been identified as a valid way of gaining access to hard to reach populations, was utilized (Patton, 2002).

### **Data Analysis**

### **Testing Mediation**

The four steps proposed by Baron and Kenny were utilized to evaluate the presence of mediation. The mediation hypothesis states that two variables are correlated through one or more mediating variables (1986). According to Baron and Kenny's mediational model, an independent variable X, for example, is related to a dependent variable Y through one or more additional variables. Each mediation analysis involves a series of four steps. The first step utilizes a regression equation to show that the independent variable (X) is correlated with the outcome variable (Y). The second step utilizes another equation to show that the causal variable (X) is correlated with the mediator variable (M). For the third and fourth step, a single regression equation is utilized in which both the independent variable (X) and the mediator variable predict scores for the dependent variable (Y). Step three is conducted by determining whether the mediator variable is a statistically significant predictor of the dependent variable when the independent variable is included as a second predictor. Step four is conducted by determining whether the standardized regression coefficient for the independent variable drops to zero or close to zero when the mediator variable is included as a second predictor. If the effect of X on Y, when M is controlled for, is zero, then complete mediation is said to have occurred (Baron and Kenny, 1986). If the standardized regression coefficient does not drop to zero but is reduced significantly in size, partial mediation is said to be present.

Four separate mediation analyses were conducted assessing the degree to which depression mediates the relationship between anxiety sensitivity and each of four outcome

measures of pain and PTSD symptomatology. Partial mediation was evaluated using the Sobel Test.

### Results

### **Descriptive Statistics**

Sixty-five veterans attempted the online survey which was available over the course of a three month time period. Only 43 participants were able to complete the survey in its entirety. For those completing the survey, 40 participants reported their age. The mean age for survey participants was 44.3 (SD = 14.02). Of those completing the survey, 36 participants identified as male and seven participants identified as female. Forty-two of the participants completing the survey identified as white and one participant identified as being of Hispanic origin.

The participants in the study represented six branches of the military. Twenty-six participants reported they had served in the Army, six participants reported serving in the Navy, two participants reported serving in the Marines, five participants reported serving in the Air Force, one participant reported serving in the reserves, and two participants reported serving in the National Guard. Twenty-seven of the participants reported they had seen combat, sixteen participants indicated they had not. Seventeen participants reported serving between zero and five years, ten participants had served from six to ten years, seven participants reported serving between and fifteen years, five participants reported serving between sixteen and twenty years, and three participants reported serving between twenty-six and thirty years. Of those completing the survey, the mean number of deployments was 1.88 (SD =2.090, Mdn= 1).

### **Descriptive Analysis**

**West Haven-Yale Multidimensional Pain Inventory (WHYMPI).** Scores for the WHYMPI range from 0 to 6, with 0 indicating no symptoms and 6 indicating an extreme level of

symptoms. For the purposes of the current study the WHYMPI was divided into three subscales, including the effects of pain on life satisfaction, the effects of pain on significant other relationships, and the effects of pain on one's daily functioning. The scores for each subscale were as follows: the effects of pain on everyday living (M=3.86, SD=1.14), the effects of pain on significant other relationships (M=2.99, SD=0.83), and the effects of pain on daily functioning (M=3.39, SD=.99).

**The Posttraumatic Stress Disorder Checklist-Military Version (PCL-M).** Scores for the PCL-M range from 1 to 5, with 1 indicating no symptoms and 5 indicating an extreme level of symptoms. The scores of the participants on the PCL-M (M=42.76, SD=17.02) on average fell within the clinical range, between 30 and 50, for posttraumatic stress disorder. Bliese and colleagues (2008) suggest lower cut off scores may be necessary to predict PTSD in outpatient military populations due to veterans' fear of the stigma of being labeled mentally ill (Bliese et al., 2008).

Anxiety Sensitivity Index-Three (ASI-3). Scores for the ASI-3 range from 1 to 5, measuring symptoms severity from very little to very much. The scores on the ASI-3 (M=40.8, SD=17.74) on average were slightly higher than those observed in other clinical populations, including individuals diagnosed with panic disorder, obsessive compulsive disorder (OCD), social phobia, generalized anxiety disorder (GAD), specific phobia, and those with health anxiety. The previous study testing anxiety sensitivity in the aforementioned populations did not examine anxiety sensitivity in individuals with posttraumatic stress disorder (Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012).

**The Beck Depression Inventory-II (BDI-II).** Scores for each individual question on the BDI-II range from 0 to 3, with 0 indicating no experiencing of a certain symptom and 3

indicating extreme experiencing of a certain symptom. In two cases, the questions regarding sleeping and appetite, the participants have two additional choices to indicate how they are experiencing a certain symptom. For example, with the appetite question, the participant may be feeling the need to eat too much or not be feeling the need to eat at all, either of which would be problematic. Likewise, on the question regarding sleep, the participant might not be sleeping at all or they may be sleeping too much. On these two questions, the participant was asked to choose their symptom severity level and then option a or b to indicate which type of symptom they are experiencing. On the BDI-II the scores (M= 42.34, SD= 15.62) indicated that the participants overall was experiencing symptoms in the severe depression range.

### **Mediation Analysis**

Mediation #1: The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on life-satisfaction. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (effects of pain on life-satisfaction) was assessed through a regression analysis predicting the effects of pain on life satisfaction from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .42$ ) was significantly different from zero, t(42) = 2.94, *p* < .01. This satisfied the first of four criteria identified by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis predicting depression from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .62$ ) was significantly different from zero, t(42) = 5.04, *p* 

< .01. This satisfied the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (the effects of pain on life-satisfaction) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .46) in this multiple regression equation was significantly different from zero, t(42) = 2.70, *p* = .010. This satisfied the third criterion for demonstrating mediation by establishing that depression contributes significantly to a regression model that includes both depression and anxiety sensitivity.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta$ =.14) was not significantly different from zero, t(42) = .809, *p* = .423, indicating that a case for full mediation can be made, even though the value for beta does not drop all the way to zero.

The presence of a significant Sobel Test (Z = 2.39, p = .016) indicated that the strength of the relationship between anxiety sensitivity and life satisfaction was weakened significantly when depression was added to a regression model predicting scores for life satisfaction. This satisfied the criterion for demonstrating partial mediation.

**Mediation #2:** The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on significant other relationships. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable (effects of pain on significant other relationships) was assessed through a regression analysis

predicting the effects of pain on significant other relationships from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .16$ ) was not significantly different from zero, t(41) = 1.04, p = .303. Due to this finding, mediation could not be completed because the first step of Baron and Kenny's model was not satisfied.

Mediation #3: The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (the effects of pain on daily functioning) was assessed through a regression analysis predicting the effects of pain on daily functioning from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta$ =-.44) was significantly different from zero, t(42) = -3.09, *p* < .01. This satisfied the first of four criteria identified by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis predicting depression from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta$  = .62) was significantly different from zero, t(42) = 5.04, *p* < .01. This satisfied the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (the effects of pain on daily functioning) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .-.34) in this multiple regression analysis was significantly different from zero, t(42) = -1.98, *p* = .054. This satisfied the third criterion for demonstrating mediation

by demonstrating that depression contributes significantly to a regression model that included both depression and anxiety sensitivity in the equation.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta = -.22$ ) was not significantly different from zero, t(42)= -1.29, p = .206, indicating that a case for full mediation can be made. Even though anxiety sensitivity did not remain significant in the model it still accounts for approximately 3% of the variability in scores for the effects of pain on daily function.

The presence of a marginally significant Sobel Test (Z = -1.87, p = .062) indicated that the strength of the relationship between anxiety sensitivity and the effects of pain on daily functioning was weakened significantly when depression was added to a regression model predicting scores for the effects of pain on daily functioning. This satisfied the criterion for partial mediation.

Mediation #4: The ability to mediate the relationship between anxiety sensitivity and posttraumatic stress disorder (PTSD). The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (PTSD) was assessed through a regression analysis predicting PTSD from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta$ =.56) was significantly different from zero, t(42)= 4.35, p <.01. This satisfied the first of four criteria by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis

predicting depression from anxiety sensitivity. The beta weight (standard regression coefficient) for anxiety sensitivity ( $\beta = .62$ ) was significantly different from zero, t(42)= 5.04, p < .01. This satisfied the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (PTSD) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .63) in this multiple regression equation was significantly different from zero, t(42)= 4.75, *p* < .01. This satisfied the third criterion for demonstrating mediation by demonstrating that depression contributed significantly to a regression model that includes both depression and anxiety sensitivity in the equation.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta = .17$ ) was not significantly different from zero, t(42) = 1.28, *p* = .207, indicating that a case for full mediation can be made. Again, even though anxiety sensitivity did not remain significant in the model it still accounted for approximately 5% of the variability in scores for the effects of pain on daily function.

The presence of a significant Sobel Test (Z = 3.53, p < .001) indicated that the strength of the relationship between anxiety sensitivity and PTSD is weakened significantly when depression is added to a regression model predicting scores for PTSD. This satisfied the criterion for demonstrating partial mediation.

### Discussion

A previous study by Jacupcak and colleagues (2006) examined the role of anxiety sensitivity and depression in the co-morbid experiencing of pain and PTSD in an inpatient veteran population. In this study, a pre-collected data set was utilized along with a medical chart review to determine if the participants in the study were experiencing pain and PTSD. The researchers also utilized a series of questionnaires to assess anxiety sensitivity, PTSD symptom severity, and depression and somatic complaints. The authors found that both depression and anxiety sensitivity were underlying factors in the co-morbid experiencing of pain and PTSD (Jacupcak et al., 2006).

The present study differed markedly from that completed by Jacupcak and colleagues. For the present study the veteran participants self-identified as experiencing both pain and symptoms of trauma. As a part of the study, the participants completed screening questionnaires to assess their symptoms of pain and PTSD and also to assess for potential symptoms of anxiety sensitivity and depression. A further difference between the Jacupcak study and the present study was the use of different measures to examine the variables in question. The hypothesis of the current study was that anxiety sensitivity would still have a significant impact on the co-morbid experiencing of pain and PTSD when depression was controlled for.

### Findings

For the first mediation examined, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on life satisfaction. This indicates that the strength of the relationship between anxiety sensitivity and the effects of pain on life satisfaction was weakened significantly once the relationship between depression and the effects of pain on life satisfaction were taken into account. When both depression and anxiety sensitivity were employed as predictor variables, anxiety sensitivity did not contribute significantly to the

regression equation predicting the effects of pain on life satisfaction. Depression, however, did contribute significantly to a regression equation predicting the effects of pain on life satisfaction when anxiety sensitivity was also included in the regression model. This set of findings was not consistent with the hypothesis that anxiety sensitivity would accounted for a significant amount of variability in this dependent measure after controlling for self-reported levels of depression.

The second mediation examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on significant other relationships. This mediation analysis could not be completed because a significant relationship was not found between anxiety sensitivity and the effects of pain on significant other relationships. The criterion specified in Step 1 of Baron and Kenny's (1986) approach to testing mediation was not met. In other words, for this dependent variable, there was no relationship between the independent and dependent variables to mediate. This result was also inconsistent with the hypothesis that a significant relationship between anxiety sensitivity and the effects of pain on significant other relationships would be observed after controlling for levels of depression. A mediation analysis is utilized to determine the extent of a relationship between two variables (in this case anxiety sensitivity and the effects of pain on significant other relationships), when a third variable (in this case depression), is added to equation.

For the third mediation analysis, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. This result indicated the strength of the relationship between anxiety sensitivity and the effects of pain on daily functioning was reduced substantially when depression was used as a mediating variable. Because the standardized regression coefficient for anxiety sensitivity was not still significantly different from zero when depression was included as a second predictor the result is inconsistent

with the major hypothesis for this analysis. After depression has been accounted for, anxiety sensitivity still accounted for 3% of the variability in the dependent variables. Therefore, anxiety sensitivity maintained a small, yet noticeable, effect after depression had been accounted for.

The fourth, and final, mediation analysis found that depression fully mediated the relationship between anxiety sensitivity and PTSD. Anxiety sensitivity did not contribute significantly to a regression model that included depression as a second predictor variable. This result is inconsistent with the major hypothesis for this analysis. As with the previous analysis, after depression was accounted for, anxiety sensitivity still accounted for 4% of the variability in the dependent variables. If the sample size had been larger, the contribution of 4% would have reached statistical significance. Also, as with the previous analysis, anxiety sensitivity maintained a small but noticeable effect after depression was used as a control variable.

### Limitations

The most notable limitation of the current study was the modest sample size. This resulted in a situation where insufficient statistical power was available to detect the small, but non-trivial contribution of anxiety sensitivity to regression models predicting scores for both the effects of pain on daily functioning and the presence of PTSD symptoms. With the available sample size of 43 participants, values of power of .21 and .30 were present for analyses of the effects of pain on daily functioning and PTSD symptoms, respectively. According to calculations available through the \*GPower software, 253 participants would have been required to achieve statistical significance for the regression coefficient for anxiety sensitivity when predicting the effects of pain on daily functioning (.177). One-hundred-seventy-seven participants would have been required to achieve statistical significance for the regression coefficient for the regression coefficient for anxiety sensitivity when predicting the sensitivity when predicting PTSD symptoms.

A second study limitation is the lack of cultural diversity in the sample. Although the research survey was distributed online and through several veterans' organizations, only one non-Caucasian participant completed the survey. This was representative of the lack of diversity in the area in which much of the recruiting for the current research study was conducted. Whereas the study was open to individuals from any ethnicity, it is important to consider that the results may have been different if there had been more diversity in the sample.

Another limitation of the study was the diversity in the age range of the participants. The researcher chose to make the survey inclusive of all military veterans, without regard to age or era in which they served. This was a conscious decision by the researcher to obtain an overview of the effects of anxiety sensitivity on the co-morbid experiencing of chronic pain and PTSD in military veterans in general. Restricting the participant pool to veterans who served in specific eras might provide insight into the mediating effects of different types of combat or combat situations on the co-morbid experiencing of pain and PTSD.

The last notable limitation was the lack of equivalent depth of the PTSD measure as compared to the chronic pain measure. The PTSD measure provided an overview of PTSD symptoms whereas the pain measure provided a more in-depth look at the specific experiences associated with the experiencing of pain. The PTSD measure utilized in the study, the Posttraumatic Stress Disorder Checklist-Military Version (PCL-M), although one of the most commonly used self-report measures of PTSD symptoms, did not provide the same depth of information on PTSD symptoms as the WHYMPI did for pain symptoms.

### **Research Implications**

When further research is conducted on the co-morbid experiencing of pain and PTSD, other possible predictive factors beyond anxiety sensitivity and depression should be explored.

As a part of their mutual maintenance theory, Sharp and Harvey (2001) proposed seven possible avenues through which pain and PTSD might be connected. As anxiety sensitivity was found to account for 4% of the variability in the experiencing of two of the pain factors in the current study and PTSD, even when depression was controlled for, it is highly probable that a number of other factors are contributing to the co-morbity of the two disorders; therefore, testing the other possible mediating factors put forth by Sharp and Harvey would provide a basis for further analysis.

Because anxiety sensitivity was found to be associated with two of the aspects of pain in the study and PTSD, further research regarding how a person develops increased anxiety sensitivity would be helpful in starting the process of learning how to manage it. The literature provides several theories regarding why a person might experience increased anxiety sensitivity. Experiencing a panic attack is a possible reason that explains increased anxiety sensitivity, due to the fear provoking symptoms associated with panic (Reis, Peterson, Gursky, & McNally, 1986). Another theory posits that anxiety sensitivity can only be developed after one has experienced a panic attack (Goldstein & Chambless, 1978). A third theory (Reis et al., 1986) is that anxiety sensitivity could occur as a result of conditioning. Future research on how one develops increased anxiety sensitivity would be helpful in determining ways to manage anxiety sensitivity.

Future research should explore a treatment modality that serves to decrease anxiety sensitivity in those veterans who are experiencing both pain and PTSD. This type of research would serve to explore how a decrease in anxiety sensitivity may decrease the likelihood of a veteran's suffering from co-morbid pain and PTSD. Existing literature on anxiety sensitivity has focused on defining the construct of anxiety sensitivity but has not yet looked at ways to manage it. Studies that explore the implementation of interventions to aid in managing anxiety sensitivity

within the veteran population would be beneficial to continue to expand the literature. Future research might examine whether proposed interventions for anxiety sensitivity served to further mediate the relationship between anxiety sensitivity and pain or PTSD.

### **Practical Applications**

The results of this study provide only limited support for the association of anxiety sensitivity with the experiencing of two of the aspects of pain covered in the study and PTSD, when depression was utilized as a control variable. Depression appears to have the more direct effect on the effects of pain and on PSTD symptomatology; however, anxiety sensitivity, in turn, appears to have a strong relationship with depression. These results may be applied in a clinical setting in several ways. Effective treatment for depression may result in beneficial effects on both the effects of pain and PTSD. However, the results also suggest that targeting anxiety sensitivity may provide an alternative therapeutic route to treatment for depression that may, in turn, magnify the positive consequences for pain and PTSD. Theories as to the origin of increased anxiety sensitivity posit that the experiencing of a panic attack may be a causal factor (Goldstein & Chambless, 1978; Reis, Peterson, Gursky, & McNally, 1986). Should the clinician work to decrease veterans' depressive symptoms and anxiety symptoms, the likelihood of their experiencing co-morbid chronic pain and PTSD may be reduced.

#### Conclusion

The current study found no significant relationship between anxiety sensitivity and any of the outcome variables remained after controlling for depression. Anxiety sensitivity did account for 4% of the variability in the outcome measures for the effects of pain on daily living and PTSD. Had the sample size been larger and the results proportionally the same for those added participants, the contribution of anxiety sensitivity would have reached statistical

significance. This research has added to the body of literature by examining a possible avenue through which chronic pain and PTSD might co-occur.

These preliminary findings regarding the role of anxiety sensitivity in the co-morbid experiencing of chronic pain and PTSD provide empirical support for practical therapeutic interventions. Clinicians working with veterans presenting with both chronic pain and PTSD can utilize evidence based treatments for anxiety and depression. Enhancing veterans' ability to cope with symptoms of depression and anxiety could serve as a protective factor against their experiencing both chronic pain and PTSD.

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#### **Chapter 2: Literature Review**

#### War Related Mental Health Effects

For soldiers who served in Operation Iraqi Freedom (OIF) and Operation Enduring freedom, facing death was an everyday occurrence. These soldiers dealt with seeing others killed, being forced to kill or wound individuals, and being on duty for extended periods of time (National Center for PTSD, 2007). Data collected by the Department of Veterans' Affairs National Center for PTSD outline the combat stressors faced in each combat theater during the height of the conflicts in 2003. For Army personnel in Iraq, 95% saw dead bodies, 93% were shot at, 89% experienced being attacked or ambushed, 86% received rocket or mortar fire, and 86% knew someone who was killed or seriously injured. For Marine personnel in Iraq, 94% saw dead bodies, 97% were shot at, 95% were ambushed or attacked, 92% received rocket or mortar fire, and 87% knew someone who was killed or seriously injured. Statistics were also reported for Army personnel in Afghanistan: 39% saw dead bodies, 66% were shot at, 58% were attacked or ambushed, 84% received rocket or mortar fire, and 43% knew someone who was killed or seriously wounded. For many veterans, the stressors they experienced during war were compounded by the fact that they were away from home for extended periods of time. Furthermore, in the case of National Guard troops, they were faced with potentially not having a job to return to upon coming home from war (National Center for PTSD, 2011).

Along with the risk factors noted above, the VA reports numerous other common stress factors that can increase the risk of veterans developing PTSD. Some of the risk factors mentioned by the VA include longer length of deployment, severe combat exposure, severe physical injury, traumatic brain injury (TBI), lower rank, lower morale or lack of social support from one's unit, married, familial problems, National Guard or Reserves, prior trauma, female,
and being of Hispanic heritage (National Center for PTSD, 2011). Further compounding this already long list of risk factors, many veterans do not seek out mental health care, which can lead to them being at even more risk for developing a trauma related disorder. Data collected between 2002 and 2009 found that 1 million troops had left active duty and become eligible for VA healthcare. Of the 1 million veterans who left active duty at that time only 46% applied for services at the VA. Furthermore, of the 46% who did come in for services, 48% were diagnosed with a mental health problem (National Center for PTSD, 2011). Among the reasons for veterans not seeking treatment from the VA were concern about being viewed as weak, concern about being treated differently, concerns about not being viewed as competent, privacy concerns, preference toward relying on family and friends, lack of confidence in treatment, worry about treatment side effects, and problems with accessing needed treatment (National Center for PTSD, 2011). In the next section, the numbers of veterans who are suffering from PTSD will be discussed, highlighting the importance of research in this area.

### **Economic Cost of PTSD**

Since October 2001, data collected by the Congressional Budget Office (CBO) show that more than 2 million service members have deployed to Iraq and Afghanistan in support of the Overseas Contingency Operations (OCO). The Veterans Health Administration (VHA) treated 400,000, or 31%, of veterans in fiscal year 2010; this was up from 100,000, or 20% of veterans who were eligible in 2005. In fiscal year 2010, the VHA spent about \$2 billion to treat veterans of OCO. In comparison, at the same time the VHA spent \$48 million in healthcare costs for veterans of all other eras and conflicts. Since 2002, the VHA has spent \$6 billion on healthcare costs for veterans of all recent OCO operations. As of September 2011, mental health diagnoses were the second largest diagnostic category treated by the VHA. PTSD made up 52% of those

mental health disorders. During fiscal years between 2004 and 2009, the VHA spent \$3.7 billion for the first four years of healthcare provided to OCO veterans. Of that total, an estimated \$1.4 billion was spent on the treatment of those veterans who had been given a diagnosis of PTSD. For a direct comparison, the cost of treating a veteran with PTSD was \$8300 compared to the \$2400 spent on treating a veteran who did not have PTSD. Although these numbers are significant, the CBO does caution that they are most likely a low estimate of the number of veterans who are experiencing PTSD and of the actual costs of treating PTSD. These estimates are low because only a small percentage of the actual number of veterans who are experiencing PTSD seek out treatment from the VHA (Veterans Health Administration, 2012). Along with the economic cost of PTSD, there are also a number of social costs associated with experiencing trauma.

### Partner Relationship Costs of PTSD in Veterans

Relational problems that commonly occur between veterans with PTSD and their significant others include marriage problems, problems with parenting, and overall poor family functioning. The National Vietnam Readjustment Study (NVVRS) compared veterans who had a diagnosis of PTSD to those veterans who did not have a diagnosis of PTSD and found that those with PTSD were twice as likely to have been divorced, three times more likely to have been divorced multiple times, and they tended to have shorter relationships (Kulka et al., 1990; National Center for PTSD, 2011). The NVVRS data also showed that families of veterans with PTSD were more likely to be dealing with physical and verbal aggression. This occurrence of violence was seen both in the veterans who were experiencing trauma and in their partners. The study found that female partners of male veterans with PTSD. This phenomenon could be

occurring due to caregiver burden. Female partners of veterans with PTSD are more likely to be carrying more household responsibilities, such as paying bills, doing housework, taking care of the children, and also taking care of their significant other. A number of reasons have been postulated as to why relational problems are prominent in families of veterans with PTSD; one explanation could be that veterans who are having trouble feeling their own emotions may also find expressing their emotions toward others to be difficult (Jordan et al., 1992; National Center for PTSD, 2011).

### **Effects of PTSD on Children and Families of Veterans**

Forty-three percent of active duty service members have children (ICF International, 2009). These children not only have to experience the trauma of having a parent leave for deployment, in many cases they also are faced with having their parent return forever changed by the experience of war. In many cases, families will be able to overcome these inherent obstacles through resilience and community support, but some of these families will need community services to help with readjustment. In fact, in a study conducted by Batten and colleagues (2009), veterans expressed an interest in services that involved the inclusion of their family members. Children of service members can have many different reactions to their parents having to leave for deployment; these reactions are likely to be tied to their developmental age. Younger children may show signs of separation anxiety. Older children and adolescents may show weaker academic performance, they may act out, or they could become apathetic (APA, 2007). The reactions of service members' children has been shown to be connected to the coping skills exhibited by the at home parent. If the at home parent is coping well, the children are less likely to show clinically significant levels of stress (Flake, Davis, Johnson, & Middleton, 2009). For veterans who have returned from combat with PTSD, data from the NVVRS has shown that their

children are more likely to experience behavior problems and to be less satisfied with their parenting. As with their partner relationships, veterans also have a difficult time sharing their emotions with their children. The worst family functioning was exhibited by veterans who were experiencing high levels of the PTSD symptoms of numbing and avoidance (Kulka et al., 1990; Samper, Taft, King, & King, 2004). In the more recent studies of veterans who have served in Iraq, Afghanistan, or both Iraq and Afghanistan, 75% of their spouses have reported one or more problems associated with family adjustment. Also, of those more recent veterans who had children, those with severe symptoms of PTSD and/or depression were more likely to report that their children were afraid of them or that their behavior seemed cold (Sayers, Farrow, Ross, & Oslin, 2009).

# **PTSD Statistics**

Recent studies have shown that 36.9% of Operation Enduring Freedom (OEF) and 50.2% of Operation Iraqi Freedom (OIF) veterans in the Veterans Affairs (VA) healthcare system have been given a mental health diagnosis, such as posttraumatic stress disorder (PTSD) or depression (Brancu, Straits-Troster, & Kudler, 2011; Cohen, Gima, Kim, Marmar, & Seal, 2010; SAMHSA, 2012). VA data shows that 27%, or 167,500, veterans of OEF and OIF have been diagnosed with PTSD (Bagalman, 2011; Brancu, Straits-Troster, & Kudler, 2011; SAMHSA, 2012). Veterans who were wounded or hospitalized due to combat related injuries were more likely to develop PTSD than were veterans who had not been injured in combat (Grieger et al., 2006; MacGregor et al., 2006; Ramchand et al., 2010; SAMHSA, 2012). The reported numbers of veterans with PTSD could potentially be a low estimate because PTSD is not always diagnosed in veterans soon after they arrive home from combat. In some cases trauma symptoms have been shown to worsen up to 12 months after a veteran has returned home from war (Milliken,

Auchterlonie, & Hoge, 2007; SAMSHA, 2012; Thomas, Wilk, Riviere, McGurk, Castro, & Hoge, 2010). PTSD is often comorbid with other physical and mental health conditions; therefore this study will look at the connection between PTSD and chronic pain. The following section will take a closer look at chronic pain in veterans.

# War Related Chronic Pain

Due to the ability of modern battlefield medicine to save many soldiers whose wounds would have been fatal in previous conflicts, a large number of veterans are coming home with chronic pain. Treating chronic pain is difficult with any population, but in treating veterans with chronic pain, doctors have to be concerned not only with their physical conditions but also with any comorbid psychological conditions the veterans may be facing as a result of their service (In the Face of Pain, 2013). As of 2000, the Veteran's Health Administration (VHA) made the decision to treat pain as the fifth vital sign, therefore indicating that pain should be assessed as a part of any Veterans Administration (VA) health assessment (In the Face of Pain, 2013). This change is important because many healthcare professionals have historically failed to recognize the complexity and implications of chronic pain on individuals. In the past, chronic pain has been viewed as a dichotomous experience, meaning it was physical and the cause could be seen or it was mental and no physical cause could be discerned. In many cases, if a physical cause for the symptoms of pain could not be found, veterans were assumed to be seeking some type of secondary gain or to be experiencing an emotional disturbance. Due to this dichotomous thinking, many veterans were told that their pain was all in their head. Research has shown that the correspondence between physical findings such as those detectable on an MRI, CT, or X-Ray machine and pain complaints are low. Conversely, physical results detected by the above mentioned machines can be evident without the experiencing of pain. For example, muscle strain

and inflammation are common causes of chronic pain, but they are virtually undetectable by modern scanning machines. Other less detectable causes of chronic pain can include HIV-related pain, sickle cell pain, nerve trauma, circulatory difficulties, and central nervous system dysfunction (Veterans Health Administration, 2010).

## **Gender Differences in Pain Reporting among Veterans**

There is a discrepancy in types of pain experienced and in the reporting of pain symptoms in male and female veterans. Overall, joint pain, back pain, headaches, limb pain, and abdominal pain were the types of chronic pain most often reported by veterans. Males tended to suffer from higher rates of back and joint pain and females tended to suffer from higher rates of headache, abdominal, and limb pain (Kaur & Stechuchak, 2007). In looking at the number of outpatient visits for pain by veterans, for men the average number of visits was 3.8 and for women the average number of visits was 4.8. Female veterans were also more likely to come in specifically to address issues related to chronic pain (Kazis et al., 1999). This reporting discrepancy of pain symptoms and seeking out treatment for pain among males and females may have some bearing on the statistics that have been reported for chronic pain among veterans.

# **Chronic Pain Statistics**

Along with the veterans who have returned home with a mental health diagnosis, a number of veterans have come back from war with physical health conditions such as chronic pain. Studies have shown that pain has been one of the most commonly reported symptoms of the veterans who served in the Persian Gulf since the cease fire in 1991 (Gironda, Clark, Massangale, & Walker, 2006; Murphy et al., 1999; Stuart et al., 2002). Gironda and colleagues conducted a study to determine a preliminary estimate of the prevalence and severity of pain among veterans of OEF and OIF. They looked at the charts of all the OEF and OIF veterans who

were registered for treatment at a Southwest Veteran's Affairs medical center. Of the veterans involved in the study, 47% of the veterans who had been evaluated for pain showed at least a low level of current pain. 28% reported having moderate to severe pain. 82% of the veterans in the study who were recorded as experiencing chronic pain had a diagnosis of musculoskeletal or connective tissue disorders. Although these findings come from the charts of one VA medical center, the numbers are high enough to indicate a need for further research into the role that chronic pain will play in the lives of veterans coming home from combat (Gironda, Clark, Massengale, & Walker, 2006). Chronic pain has been shown in numerous studies to be connected with the risk of suicide in a number of different populations which is one reason for concern about the high numbers of veterans experiencing chronic pain (Braden & Sullivan, 2008; Fishbain, 1999; Fishbain, Goldberg, Rosomoff, & Rosomoff, 1991; Hitchcock, Ferrel, & McCaffery, 1994; Ilgen, Zivin, McCammon, & Valenstein, 2008; Ratcliffe, Enns, Belik, & Sareen, 2008; Smith, Edwards, Robinson, & Dworkin, 2004; Stenager, Stenager, & Jensen, 1994; Tang & Crane, 2006). Hitchcock and colleagues found that 50% of chronic pain patients had thoughts of taking their own lives as a result of their chronic pain disorders (Hitchcock, Ferrel, & McCaffery, 1994). In the next section, the risk of suicide will be discussed along with the connection between suicide and pain and the connection between suicide and PTSD. The relevance of mentioning suicide in relation to the current study will be discussed.

## **Suicide in Veterans**

Current findings of a study by the Department of Veterans Affairs (VA) reveal that US military veterans are taking their own lives at a rate of twenty-two suicides per day. At this rate, our country is losing 8,030 veterans each year (Suicide Data Report, 2012) to suicide. Indeed, the rate of suicides that are occurring within the military currently exceeds that of the general

population of the United States (Lee, 2012). Further compounding the issue of suicide among veterans, of the 23.4 million current military veterans only 5.1 million, or 22%, receives their medical care through the VA medical system. The other veterans who are receiving mental healthcare are being treated by practitioners who are not affiliated with the VA medical system (Rice & Sher, 2012; US Dept. of VA office of Policy and Planning, 2009).

Kapur and colleagues (2009) examined the suicide risk of individuals upon leaving the armed forces. The study was retrospective and looked at data obtained from a cohort of ex-armed forces personnel. Specifically, they were looking for the number of deaths by suicide that occurred within the cohort after their time in the armed forces had ended. The researchers then made comparisons between the records obtained from the cohort of ex-armed forces members and members of the general population. They found that the risk for men aged 24 years and younger who had left the armed forces was two to three times higher than that found in men of the same age in the general population. Furthermore, they noted that the risk was consistent, but may have been higher in the first couple of years after leaving the armed forces (Kapur, While, Blatchley, Bray, & Harrison, 2009). This study was done in the United Kingdom, yet the results may be relevant to the United States, because we also have a large number of veterans in the at risk age range. As of 2011, there were 257,163 living veterans who were age 24 and below in the United States (National Center for Veterans Analysis and Statistics, 2009).

Bryan and colleagues (2013) conducted a two part study that looked at the link between a veteran's exposure to combat situations and his or her risk for suicide. In the first part of the study, the participants included 348 active duty Air Force Security Forces Personnel who were deployed to Iraq. Upon their arrival in Iraq, the participants completed a self-report questionnaire packet as a part of the normal psychological screening; this was used to ascertain their baseline

level of functioning in case they were injured over the course of the deployment. The questionnaires included a scale that measured combat experience, a trauma symptoms scale, a measure of depression symptoms, along with measures of thwarted belongingness, perceived burdensomeness, and acquired capability for suicide and risk for suicide. The initial analyses found low levels of suicide risk, depression, and PTSD symptom severity. In the population that was initially analyzed, the overall number of distinct combat experiences was 2.97 times. Suicide risk was directly correlated with depression, PTSD, and feelings of thwarted belonging, but was negatively associated with acquired capability for suicide. Acquired capability for suicide as defined by the authors of the study was a feeling of fearlessness about death and a feeling that one is being able to handle more pain than others (Bryan, Hernandez, Allison, & Clemans, 2013). Bryan and colleagues sought to find out if these results would generalize to a second group of participants.

In the second part of the same study, Bryan and Colleagues (2013) used the same measures to analyze suicide risk with a separate group of participants. The participants in the second part of the study were 219 deployed military personnel presenting to an outpatient mental health clinic for assessment for or treatment of traumatic brain injury (TBI). The results mirrored those found in the first part of the study. Depression and PTSD were linked to suicide risk, but not acquired capability. The findings of both phases of their study, the first with a non-clinical sample and the second with a clinical sample, led the authors to conclude that combat exposure was neither directly nor indirectly related to suicide. However, they did find that combat exposure was directly related to PTSD, which was strongly correlated with depression, and that depression was either directly or indirectly related to suicide risk (Bryan, Hernandez, Allison, & Clemans, 2012). Therefore, the authors said that although combat exposure does not necessarily

lead to an increased risk of suicide, combat exposure can lead to the development of PTSD which has been linked to depression and suicide risk.

# **Psychiatric Diagnosis and Suicide**

In a similar study, Illgen and colleagues (2010) looked at the strengths of association between several different psychiatric diagnosis and subsequent suicides in veterans who were receiving services from the VA. Their sample was made up of 3, 291,891 individuals who had received services from the Veterans Health Administration (VHA). The study followed veterans from 1999 until 2006. During the seven years of the study, 7,684 veterans died of suicide. The researchers found that psychiatric disorders were strongly correlated with increased suicide risk among VHA patients in a given year. The strength of the association between psychiatric diagnosis and suicide was stronger for women than for men, which is notable because data from the National Center for PTSD has cited being female as a risk factor for the development of trauma symptoms (National Center for PTSD, 2011). Some diagnoses involved greater risk for men and some involved greater risk for women. For men, the risk for suicide was greatest for those suffering from bipolar disorder, followed by depression, substance abuse disorders, schizophrenia, other anxiety disorders, and posttraumatic stress disorder (PTSD). For women, the disorders of most concern due to the increased risk of suicide were substance use disorders, bipolar disorder, schizophrenia, depression, PTSD, and other anxiety disorders (Ilgen et al., 2010).

Brenner and colleagues (2011) looked at the connection between suicide and the experiencing of traumatic brain injury (TBI) and or PTSD in a database at a large Western Veteran's Affairs hospital. They chose eighty-one veterans who had a history of suicide attempts between October 2004 and February 2006 as participants. The medical records of the chosen

veterans were analyzed for terms that would indicate a suicide attempt or a completed suicide, PTSD, TBI, and neurological disease. The study found that veterans who had a diagnosis of PTSD were more likely to have had a suicide attempt. The odds of a veteran with a diagnosis of PTSD having a suicide attempt was 2.8 times greater than those who did not have a diagnosis of PTSD. Furthermore, veterans who had a diagnosis of PTSD and TBI were 3.3 times more likely to have had a suicide attempt than those who only had a diagnosis of TBI (Brenner et al., 2011).

## **Chronic Pain and Suicide Risk**

Along with psychiatric diagnoses, general medical conditions, specifically chronic pain disorders, also increase the risk of suicide in veterans. Thompson and colleagues (2006) screened 100 veterans who were receiving treatment for opiate dependence due to chronic pain for suicidal ideation. Of those screened, 24% reported at least some suicidal ideation. Current suicidal ideation for those in the study was linked to ongoing chronic pain and other problems, such as legal troubles. Risk for suicide was also found in those who had only recently presented for treatment. Of note, two of the veterans who were screened required emergency hospitalization (Thompson et al., 2006). Due to the findings of this study, more information was needed to determine the connection between chronic pain and suicide.

Kanzler and colleagues (2012) noted the link between suicide and chronic pain and designed a study to examine the possible role that perceived burdensomeness might play in patients with chronic pain and suicidal ideation. Participants were 113 patients with complaints of pain who were referred to a clinical health psychology clinic in a large military medical center. The participants completed four inventories that measured depression, pain severity, perceived burdensomeness, and suicidal ideation. The study found elevated levels of depression and chronic pain in the population. As the authors predicted, the study also found that

depression, chronic pain, and suicidal ideation were correlated. Therefore, perceived burdensomeness should be considered beyond endorsed feelings of depression, pain severity, age, and gender, when evaluating the suicide risk of a person with chronic pain (Kanzler, Bryan, McGeary, & Morrow, 2012). Additionally, anxiety sensitivity may also be playing a role in the connection between pain and suicide risk.

## **Anxiety Sensitivity**

Defining anxiety sensitivity. The concept of anxiety sensitivity dates back to the time in which Freud was practicing psychiatry. In 1985, Reiss and McNally updated the concept of fear of fear by dividing it into two separate processes; these processes were labeled anxiety expectancy and anxiety sensitivity (Reiss & McNally, 1985; Reiss, Peterson, Gursky, & McNally, 1986). Anxiety expectancy can be defined as the process of learning that some situations will be anxiety provoking. For the purpose of this study, the focus will be on anxiety sensitivity. According to Reiss (2000), anxiety sensitivity has its roots in the genes that render anxiety unpleasant and in individuals' beliefs about the personal consequences of experiencing anxiety. For example, a person might be said to have a high level of anxiety sensitivity if he or she believes that the experiencing of anxiety could lead to extreme health consequences. Reiss (2008) gives the example of a person experiencing the increase in heart rate associated with anxiety as being a sign of an impending heart attack. There are several reasons why a person might experience increased anxiety sensitivity. If a person has had a panic attack in the past it could lead to them having a higher level of anxiety sensitivity due to the fear-provoking symptoms associated with panic (Reiss, Peterson, Gursky, & McNally, 1986). Goldstein and Chambless (1978), whose work on the concept of fear of fear laid the groundwork for Reiss and McNally's work, proposed that fear of fear could only be developed after one had experienced a

panic attack. Reiss and colleagues (1986) also believed that fear of fear could be developed after experiencing a panic attack, but they further believed that fear of fear could occur as the result of conditioning. To use the example put forth by Reiss and colleagues, a child whose parents always taught him to maintain a certain appearance might grow to avoid certain situations that could lead to anxious perspiring (Reiss, Peterson, Gursky, & McNally, 1986). In this example, the child would be more anxious about the result of his **a**nxiety (perspiration on his shirt) than the actual anxiety producing situation (talking in front of a group). Once anxiety sensitivity was defined, the next step involved validating the construct.

Validating the construct of anxiety sensitivity. Reiss and colleagues (1986) undertook a three-step process to validate the concept of anxiety sensitivity and to demonstrate that anxiety sensitivity was a separate and measurable construct. They wanted to show that a measure of anxiety sensitivity could predict fearfulness while other measures of anxiety could not. In beginning their study, Reiss and colleagues tested the psychometric properties of the newly developed Anxiety Sensitivity Index (ASI). Their next step involved testing their new measure of anxiety sensitivity for its relevance in measuring psychological conditions such as agoraphobia and other anxiety disorders. Lastly, the relationship between anxiety and anxiety sensitivity was tested. In evaluating the ASI, Reiss and colleagues found the measure to have sound psychometric properties. Furthermore the newly created ASI was able to clarify the variance found in the Fear of Fear Scale-II (FFS-II), which could not be explained through the use of the Taylor Manifest Anxiety Scale (TMAS) or the Anxiety Frequency Checklist (AFC). This finding marked the first evidence provided to validate the unique construct of anxiety sensitivity.

The second part of the study shed light on the relationship between anxiety sensitivity and fearfulness. The authors proposed that the relationship between anxiety sensitivity and

fearfulness could be a predisposing factor to the development of fears and other anxiety related disorders. To illustrate this view, a person who believes that anxiety really does not have many negative consequences might be able to cope with a higher level of anxiety producing stimuli, while a person who believes that experiencing anxiety can lead to a stroke might have a more difficult time coping with anxiety provoking situations. Finally, the authors did not find a unique relationship between the fear of fear and agoraphobia. While individuals suffering from agoraphobia did have high levels of anxiety sensitivity, individuals who did not suffer from agoraphobia also were found to have elevated levels of anxiety sensitivity based on other anxiety problems (Reiss, Peterson, Gursky, & McNally, 1985).

Anxiety sensitivity as a significant fear. Building upon their previous research identifying anxiety sensitivity as a unique construct separate from other types of fears, Reiss and colleagues developed a second study. In their follow up study they sought to demonstrate that anxiety sensitivity was not just another type of fear, but one with significance. Reiss and colleagues gave an example that involved determining the relationship between three types of fear, fear of heights, fear of spiders, and anxiety sensitivity. Logically, one could say that fear of heights has nothing to do with fear of spiders, for example, but anxiety sensitivity could be linked to fear of heights and spiders. In other words, if one fears anxiety, then one could also fear any number of other anxiety provoking stimuli (Reiss, Peterson, & Gursky, 1987).

They first evaluated the factor validity of the fear of anxiety. They then re-tested the suggestion that anxiety sensitivity is related to fearfulness while controlling for the general tendency of any one fear to predict another. The first part of the study demonstrated that anxiety sensitivity had unique characteristics that were not common to other fears. The second part of the study found that the tendency for people who have one type of fear to also have other types of

fears is much more common than previous psychological models of fear have suggested (Reiss, Peterson, & Gursky, 1987).

#### **Recent Studies Involving Anxiety Sensitivity**

Marshall, Miles and Stuart (2011) conducted a longitudinal study to examine whether or not anxiety sensitivity and PTSD symptom severity were reciprocally related in the case of physical trauma. The sample was recruited between February 2004 and August 2006 from trauma centers in Los Angeles County. The participants were screened for PTSD using the Posttraumatic stress disorder Checklist (PCL) and were assessed for anxiety sensitivity using the Anxiety Sensitivity Index (ASI). The researchers utilized covariance structure modeling within a cross-lagged panel analytic framework to examine the interconnectedness of anxiety sensitivity and the symptom severity of PTSD for this longitudinal study of survivors of physical injury. The first finding of the study was that anxiety sensitivity predicted future PTSD symptom severity even after initial posttraumatic stress was controlled for. The study found that PTSD symptoms also influence anxiety sensitivity over time. The authors suggested that since PTSD and anxiety sensitivity have been shown to have bidirectional effects, anxiety sensitivity should be assessed at the onset of treatment for posttraumatic stress (Marshall, Miles, & Stuart, 2011).

In similar research, Berenz and colleagues (2012) conducted a study to look at the role of anxiety sensitivity and distress tolerance in PTSD severity in trauma exposed adults. The participants in the study were 88 civilian adults who met the DSM-IV criterion A for lifetime trauma exposure on the Clinician-Administered PTSD Scale. For the purposes of the study, behavioral distress tolerance was measured using a Breath-Holding Task. The breath-holding task required the participants to hold their breath as long as possible. The participants were asked to complete the breath-holding task twice and their tolerance measure was the average number of

seconds they held their breath across the two trials. Anxiety sensitivity was found to be significantly incrementally associated with PTSD total symptom severity as well as with avoidance and hyper arousal symptom severity. Breath holding did not correlate significantly with PTSD symptom severity, but breath holding did moderate the association between anxiety sensitivity and PTSD avoidance symptom severity (Berenz, Vujanovic, Coffey, & Zvolensky, 2012). In the next section PTSD will be discussed in more detail.

# Posttraumatic stress disorder (PTSD)

**Brief history.** PTSD was introduced as a separate diagnostic category in 1980 with the release of the Diagnostic and Statistical Manual for Mental Disorders Three (DSM-III). When PTSD was added to the DSM-III, there was a change in the way experiencing trauma was viewed. Persons who experienced symptoms of posttraumatic stress were no longer viewed as being weak. With the advent of the new diagnosis, the etiology of PTSD was said to be outside of the individual experiencing the trauma symptoms. By DSM-III standards, a diagnosis of PTSD could only be given if an individual had experienced a stressor that was outside the realm of everyday experience. The developers of the original diagnostic criteria had in mind events such as war, torture, rape, etc., when they were defining what type of trauma could be associated with a PTSD diagnosis. The original developers believed that common life stressors such as divorce, failure, rejection, etc., should be classified as adjustment disorders. The criteria for PTSD have been updated with every subsequent addition of the DSM.

**Diagnosing PTSD.** The development of posttraumatic stress disorder (PTSD) is characterized by the advent of symptoms following a traumatic event involving immediate danger, threat of danger, or hearing about danger to oneself or another. Further, the response to the threat must involve the feeling of helplessness or horror (American Psychological

Association, 2000). Symptoms of PTSD may include intrusive thoughts or nightmares, avoidance of people, places, or things that may cause re-experiencing, along with heightened startle responses, poor sleep, and in some cases anger (American Psychological Association, 2000). In the general population of the United States, the estimated lifetime prevalence of PTSD is 6.8% (Kessler, Bergland, Demler, & Walters, 2005). Individuals who are engaged in military combat are 13% more likely to be exposed to a traumatic event and subsequently develop PTSD (Seal, Bertenthal, Miner, Sen, & Marmar, 2007). The present study focused on the effects of PTSD as they pertain to military veterans.

## **Biological Foundations**

Recent research has found that PTSD may have biological underpinnings (Van Liempt et al., 2013). Acknowledging that nightmares and insomnia are two of the most prominent symptoms of PTSD, Van Liempt and colleagues were perplexed as to why only minor changes to sleeping patterns were found by polysomnography (PSG) in veterans with PTSD. They conducted a study geared toward finding an alternative method for assessing sleep regulation in PTSD. They began by screening their participants, military veterans with PTSD and without PTSD, to ensure they did not have obstructive sleep apnea or periodic limb movement disorder. Their participants included 13 veterans with PTSD, 17 trauma controls, and 15 healthy controls. The veterans participating in the study slept a total of two nights in a sleep laboratory with an IV catheter from which blood was drawn every 20 minutes from 22:00 h to 08:00 h. Levels of nocturnal plasma adrenocorticotropic hormone (ACTH), cortisol, and melatonin were assessed in conjunction with PTSD woke more often during the night in comparison to both control groups. The levels of ACTH found in the blood during the nights were related to the awakenings and the

patients' subjective evaluation of their depth of sleep. PTSD patients also had an increased heart rate as compared to the two control groups. These findings suggest that the hypothalamopituitary-adrenal (HPA) axis is related to the fragmented sleep that comes with PTSD. A causal relationship between sleep problems and the activity of the HPA axis in PTSD was not found in the study (Van Liempt et al., 2013).

**PTSD** and sleep. Germain and colleagues (2013) also looked at the effects of sleep on PTSD. Based on previous research that found REM sleep to offer an entry point into the primitive emotional brain every night through activation of the limbic system (Nofzinger et al., 1998), Germain and colleagues utilized fluoro-deoxyglucose (FDG) and positron emission tomography (PET) to explore metabolic changes in the limbic system during wakefulness and while a combat exposed veteran was awake and while they were experiencing REM sleep. The participants in the study were veterans from Operations Enduring and Iraqi Freedom, with and without diagnoses of PTSD. The study found that combat veterans with PTSD experienced hypermetabolism in brain regions associated with arousal regulation, fear responses, and reward processing which were persistent during REM sleep.

**PTSD and neuropsychological functioning.** Soble and colleagues (2013) took the study of the neurology of PTSD to an even deeper level by looking at the neuropsychological functioning of combat veterans with PTSD and mild traumatic brain injury (TBI). These researchers wanted to find out if mild traumatic brain injury could worsen the symptoms of PTSD. The participants in this study were 125 outpatient Operation Enduring Freedom /Operation Iraqi Freedom veterans who had been diagnosed with both PTSD and mild TBI. These veterans were tested across multiple cognitive domains. The study found that those veterans with PTSD and TBI did not differ significantly in their scores from those veterans who

only suffered from PTSD. The authors concluded that mild TBI did not add to the effects of PTSD. Further, the authors completed a norms based comparison and found that neither group demonstrated impaired performance on any of the objective neuropsychological measures they were tested on. Salient to the present study, both groups showed elevated levels of depression and anxiety. The authors interpreted this finding as meaning that comorbid psychopathology could contribute to the subjective cognitive complaints experienced by those with comorbid PTSD and mild TBI (Soble, Spanierman, & Smith, 2013).

Larson and colleagues (2013) also looked at the neurological effects of PTSD and postconcussive complaints as related to PTSD. The goal of this study was to gain a better understanding of how impairments in memory are related to post-concussive complaints and to PTSD, further they wanted to see if the results of their study could be maintained after controlling for premorbid cognitive ability. The researchers examined memory impairment, premorbid cognitive ability, post-concussive complaints, and symptoms of PTSD in 205 veterans. Of the participants, 135 self-reported a history of concussion and traumatic life events. The study found that memory impairment was not associated with a history of concussion alone; it was associated with the severity of the complaints post-concussion. Interestingly, these associations did not stand true when premorbid IQ was controlled for. A PTSD diagnosis was associated with memory impairment, but the memory impairment was not linked to the severity of the PTSD symptoms. These results indicate that symptom severity and recovery are related not only to trauma severity but also to both premorbid risk factors and complications arising after the trauma (Larson, Kondiles, Starr, & Zollman, 2013).

Simmons and colleagues (2013) looked at the neural connection to PTSD from another angle. These researchers tested the hypothesis that individuals with combat-related PTSD would

show increased activation in the insula and related emotion-processing circuitry when anticipating emotionally significant events such as those seen in combat-related images, and this increased response would be advanced during temporal unpredictability. The participants in the study were 30 veterans, 15 of whom had been diagnosed with PTSD, and 15 of whom had combat exposure but no current or lifetime diagnosis of PTSD. The participants performed a temporal unpredictability anticipation task of combat-related images and pleasant images while undergoing an fMRI. The study found that an excessive anticipatory reaction in individuals with PTSD to temporarily unpredictable combat related stimuli may relate to a greater perceived threat. These findings are in accordance with the psychological models of PTSD that associate PTSD with decreased predictability and control (Simmons et al., 2013). The preceding studies demonstrate the fact that PTSD has direct effects on veterans at the neurological level. Along with the suggested neurological connections to posttraumatic stress disorder (PTSD), there are numerous sociocultural and environmental factors that have been shown to influence the development and severity of PTSD.

### Sociocultural and Environmental Foundations

Maguen and colleagues (2013) studied the role that killing in combat had in the symptomology of PTSD in veterans. Their study was made up of 227 veterans of Operations Enduring and Iraqi Freedom who met DSM-IV criteria for sub-threshold or full PTSD. Information was gathered about the veteran's PTSD symptoms, combat exposure, killing in war, and the types and circumstances of killing. The authors found that the largest group of individuals who had reported killing was in the high symptomology group, in fact, they faced twice the odds of being in the most symptomatic PTSD group of those who had not killed in

combat. Thus, the authors suggest that killing in war may indicate a risk of developing frequent and severe PTSD symptoms (Maguen et al., 2013).

Although one of the more dramatic potential causes, killing in war is only one of the precursors for a veteran's developing PTSD. Herringa and colleagues (2013) examined the neural correlates of childhood and adult trauma exposure and posttraumatic stress disorder. The participants in their study were a group of non-medicated male combat veterans with a wide range of posttraumatic stress symptoms. As a part of the study, participants completed an emotional face-morphing task while undergoing functional magnetic resonance imaging (fMRI). Participants were also asked to complete the Clinician Administered PTSD Scale (CAPS), Childhood Trauma Questionnaire (CTQ), and the Combat Exposure Scale (CES). The researchers recorded the results from both an angry position and a happy position. In the angry position, CAPS scores correlated positively with activation in the medial prefrontal cortex. The CES and CTQ correlated positively with the activation in adjacent areas of the dorsal anterior cingulate cortex. In the happy condition, none of the measures were correlated significantly with activation patterns. The specificity of results to threat stimuli and not to positive stimuli is consistent with the abnormal threat processing linked to PTSD. The researchers believe the findings of this study indicate that childhood and adult trauma exposure may make the brain more vulnerable to symptoms of traumatic stress (Herringa, Phillips, Fournier, Kronhaus, & Germain, 2012).

Along the same lines as the study done by Herringa and colleagues, Barrera and colleagues (2013) looked at the influence of trauma history on panic and posttraumatic stress disorder in returning veterans. Specifically the authors of this study were looking at the role of predeployment sexual and physical abuse, combat exposure and post-deployment social support

in predicting panic disorder and PTSD in returning veterans. The researchers reviewed the charts of 1740 veterans from Operations Enduring and Iraqi Freedom who were receiving treatment at a large veteran's affairs hospital. The study found that veterans who endorsed pre-deployment sexual or physical abuse were likely to be diagnosed with comorbid panic disorder and PTSD. A further finding of the study was that panic disorder was more closely associated with suicide risk than was PTSD. The authors therefore suggested that veterans should be assessed for both panic disorder and PTSD upon returning from combat (Barrera, Graham, Dunn, & Teng, 2013).

## **Predicting Delayed Onset PTSD**

Unfortunately, veterans who have left the service without PTSD are still at risk for developing symptoms of PTSD at a later date. Brewin and colleagues reviewed the VA charts of a number of veterans who were receiving a war pension to see how the charts of those who had developed late onset PTSD were different from those who had developed PTSD while serving. The study found that the charts of those who developed PTSD post discharge looked no different while they were in service than the charts of those who never developed PTSD. The study did find that those who developed PTSD later after discharge had a history of more disciplinary offenses, specifically absence without leave, disobedience, and dishonesty, than did the group without PTSD. Also, this inflated number of offenses occurred before the participant had been exposed to any military related trauma. The authors saw the results of this study as indicative of a link between externalizing disorder and the risk for PTSD. The authors further suggested that identifying early signs of externalizing disorder may help to recognize military personnel who may be at risk for PTSD (Brewin, Andrews, Hejdenberg, & Stewart, 2012).

# PTSD in DSM-5

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) was released in May 2013. Most of the criteria for PTSD remain the same as those in the previous edition as stated above, although some minor changes were made. The diagnosis of PTSD was moved from the category of anxiety disorders to the new category of trauma and stress related disorders. Another change in the DSM-5 involves dividing the three clusters of symptoms into four clusters. Also, PTSD can develop from hearing an account of a close friend or relative's trauma experience. The criterion of avoidance and numbing was divided into two separate criteria, avoidance and negative alterations in cognitions and mood. Alterations in arousal and reactivity were added as a symptom category. These symptoms may be evidenced by reckless or destructive behavior. Criterion A2, requiring fear, helplessness, or horror right after the trauma, was deleted because it was not shown to be helpful in forming a diagnosis. The final change between DSM-IV and DSM-5 is the addition of a PTSD subtype labeled Dissociative PTSD. A diagnosis of Dissociative PTSD would be given if a person were experiencing PTSD with added symptoms of disassociation and derealization (Highlights of Changes from DSM-IV-TR to DSM-5, 2013). The current review of the literature has been based solely upon DSM-IV criteria because the DSM-5 has only recently been released. As there are only minor variations in the diagnostic criteria between DSM-IV and DSM-5 the information from the studies represented remains applicable. The next section will discuss chronic pain in relation to veterans with PTSD. **Chronic Pain** 

**Defining chronic pain.** Chronic pain, for the purposes of the current study, can be described as pain that lasts longer than three months and that was initially accompanied by an illness or accident that may have healed (IASP, 1994).Chronic pain is not a minor problem in the U.S. According to at least one estimate, 116 million Americans are affected by chronic pain.

Including direct medical costs and reduced worker productivity, the monetary toll of chronic pain can reach over 600 billion dollars annually (Care and Education Committee on Advancing Pain Research, 2011). Information collected from the Veteran's Affairs (VA) Healthcare System found that 50% of veterans who come in for treatment experience chronic pain regularly (Kerns, Otis, Rosenberg, & Reid, 2003).

Veterans of the Persian Gulf War reported chronic pain symptoms more commonly than any other war related symptomology (Kroenke, Koslowe, & Roy, 1998). Similarly, a current study done by Gironda and colleagues (2005), found that 47% of OEF/OIF/OND veterans reported experiencing chronic pain and 59% of those veterans reported pain that was severe enough to cause physical limitations (Gironda, Clark, & Walker, 2005). Clark (2004) cited several reasons why Operation Enduring and Iraqi Freedom veterans would be at an even higher risk than those who served in the Persian Gulf. Among the risks cited by Clark were high explosive blast injuries, gunshot wounds, and injuries resulting from motor vehicle accidents. In previous combat situations these wounds would have most likely proven fatal, but due to modern combat medicine more recent veterans were able to survive intense trauma and come home (Gironda, Clark, Massengale, & Walker, 2006; Hussem et al., 2002; In the Face of Pain, 2013; Nederhand et al., 2003; Richards, Stover, & Jaworski, 1990).

# The Association between Chronic Pain and Mental Health Disorders

Helmer and colleagues (2009) conducted a study with the aim of describing the associations among pain, mental health concerns, and function in veterans of Operations Enduring and Iraqi Freedom (OEF/OIF). The data was collected retrospectively from self-reported, standardized clinical intake surveys. The participants were 429 veterans of OEF/OIF who presented for clinical evaluation at a multidisciplinary deployment health clinic at a

Veteran's Affairs (VA) medical center. For the collected sample of veterans, the majority reported good or better general health, chronic widespread pain was common and led to poorer physical role function, independent of comorbid mental health conditions (Helmer et al., 2009).

Paltsev and colleagues (2010) looked at the role of combat stress in the formation of chronic pain syndrome in combatants. For the purposes of their study, combat stress was defined as a multilevel adaptive process in conditions of combat situations accompanied by tension in reactive self-regulation mechanisms and reinforcement. This definition of combat stress was obtained from a previous study completed by Litvintsev & colleagues (2005). The researchers defined pain as a sensory and emotional experience associated with actual or possible tissue damage or described on the basis of such damage; this definition of pain was taken from a study published in the journal Pain and Analgesia (2004). The authors suggested that pain should not be looked at in terms of time, but in terms of the processes underlying the conduction and control of pain at the level of cerebral structures. For their study, Paltsev and colleagues assessed 161 veterans who had served in Afghanistan and Chechnya or both. Of the participants, 155 or 96.3% of them reported experiencing stress related to their experiences in combat. Of the stressful events measured by the researchers, deaths of comrades, wounding of comrades, involvement in combat situations, wounding, and being captured had the most influence. After the end of their time in service, 123 of the veterans experienced a number of stress factors including trauma, loss of property, loss of work, divorce, death of loved ones, and illness in loved ones. Everyday and combat stressors were observed in 124 of the participants. Mild PTSD was detected in 42 participants, moderate PTSD was found in 47 participants, and severe PTSD was found in 58 of the participants. PTSD was correlated with factors such as involvement in armed conflicts, wounding, death of a comrade, and with the severity of pain syndrome. Of the participants

studied, 157 had some type of pain syndrome with chronic pain found in 141. Of those experiencing chronic pain the most intense forms were headaches, lower spinal pain, neck pain, and joint pain. The types of pain most associated with mental impairments were chronic headaches where people were more likely to experience anxiety, depression, sleep disorders, and memory impairments. These impairments were also seen in participants experiencing lower back pain. Chronic pain in the neck, chest pain, abdominal pain, and limb pain were less likely to lead to these types of mental impairments (Paltsev, Torgashov, Voronova, Bayandina, & Lunyakina, 2010).

Whereas the original theorists put forth information on the co-occurrence of PTSD and pain in specific types of patient groups, more recent studies have provided information about the co-occurrence of Pain and PTSD in the general population (Beck & Clapp, 2011). The National Comorbidity Replication Survey found that 7.3% of those diagnosed with chronic back pain also have PTSD (VonKorff et al., 2005). These results were also found in a Canadian Community Health Survey, which indicated that community members who had a diagnosis of chronic pain were 7.7% more likely to have PTSD if their pain stemmed from Fibromyalgia and 46% more likely to have PTSD if they suffered from back pain (Sereen et al., 2007). At this time, there have been no similar studies utilizing veterans as participants.

### **Veterans' Perspectives of Chronic Pain**

Matthias and colleagues (2012) looked at chronic pain from a slightly different perspective. They investigated veterans' perceptions of pain, specifically by using a pain intervention with the acronym ESCAPE (Evaluation of Stepped Care for Chronic Pain). The participants were 26 veterans. The researchers used grounded theory with constant comparative methodology to obtain their data. Participants were interviewed face to face and asked open

ended questions such as "Why did you participate in ESCAPE?" Patients were also asked which components of ESCAPE, including medication management, self-management, brief Cognitive Behavioral Therapy (CBT), and follow up phone calls, were most and least helpful and why. Patients were asked about their interactions with the studies nurse care manager, their successes and challenges with pain management and finally they were asked about the interpersonal relationships with family, friends, and healthcare providers. The researchers found the participants willing to speak about their changing levels of understanding about their pain experience throughout the treatment trial and about how they were able to utilize what they were learning to more effectively deal with their pain. They also talked about learning how physical and psychosocial factors affected their pain levels. Several participants talked about how ESCAPE had changed their attitudes toward their pain and how that had been helpful to them in coping with their pain. As the title of the work suggests, participants of the study learned that there was more to pain than just pain; they learned that stress, anxiety, and depression can all factor into the experiencing of pain. A number of the patients noted that by changing their thought patterns they were able to take control of their pain (Matthias, Miech, Myers, Sargent, & Blair, 2012). Through the use of the ESCAPE protocol, researchers were able to investigate the changing experience of pain from the perspective of the veterans who were experiencing the pain. In the next section, the new DSM-5 diagnostic criteria for pain will be discussed.

## Pain Disorders in DSM-5

The DSM-5 definition for chronic pain is slightly different than the previous DSM-IV-TR definition. Whereas the DSM-IV criteria for pain breaks the experience into distinct parts, such as psychological based, illness based or injury based, the DSM-5 purports that all pain has some psychological basis and that most people who experience pain attribute it to a combination of

factors rather than to one distinct cause. Using the DSM-5, clinicians would base their pain diagnoses on the exact symptoms their clients were experiencing. For example, some might be diagnosed with somatic symptom disorder, some with psychological factors affecting another medical condition, and some pain symptoms may be accounted for by an adjustment disorder. By not putting everyone with pain in the same category, the DSM-5 will make more targeted treatment possible (APA, 2013). As the DSM-5 has just been released, the current literature review is based on DSM-IV-TR criteria for pain. In the next section depression will be defined and reasons will be given as to why it is being controlled for in the current study.

# Depression

**Statistics for depression in veterans.** Depression is one of the most diagnosed and the most expensive mental health conditions to treat. In the United States, \$66 billion is spent annually on treating depression alone; treating veterans with depression accounts for 14% of the expenditure. Between the years of 2000 and 2007, the charts of more than 206,000 veterans were reviewed. The data from the charts revealed that one in three veterans had been diagnosed with at least one mental health disorder. The diagnosis rate of depression was 14% and studies suggest that this number may be a low estimate of the actual number of veterans who were suffering from depression during the given time period (National Institute of Mental Illness, 2010).

**Diagnostic criteria for depression.** In the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (DSM-IV-TR, 2004), depression can be broken down into two categories based upon the degree of symptomology. A major depressive episode is characterized by a period of at least two weeks when a person shows a loss of interest or pleasure in nearly all activities that were once pleasurable. For a person to be given a diagnosis of Major

Depressive Disorder, they must have experienced one or more major depressive episodes without a history of manic, mixed, or hypomanic episodes (DSM-IV-TR, 2004).

**Depression and posttraumatic stress disorder.** The experiencing of comorbid PTSD and depression has been associated with negative outcomes in both physical and mental health in combat veterans who have served in Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF). Pittman and colleagues (2012) conducted a study to find out if depression and PTSD would each significantly impact health-related quality of life in veterans even when they controlled for overlapping symptoms such as anhedonia, concentration, and insomnia. The participants in the study were 220 OEF/OIF veterans. The authors found that both depression and PTSD significantly affected veterans' mental health related quality of life, but the main effect was not found for veterans' physical-health related quality of life (Pittman, Goldsmith, Lemmer, Kilmer, & Baker, 2012).

The impact of depression on the symptom of anger in PTSD. Previous research on the experiencing of anger as a part of PTSD has found that anger is the most significant predictor of the severity of PTSD symptomology (Novaco & Chemtob, 2002). Several of the adverse effects of PTSD have been attributed to anger, including poorer physical health, a reduced response to treatments that have an evidence base, and to aggression (Ouimette et al., 2004; Rizvi et al., 2009; Teten et al., 2010). Raab and colleagues (2013) conducted a study to look at the role of depression in the experiencing of anger in PTSD. Participants in the study were 98 combat veterans who had experienced combat in Vietnam, Operation Enduring Freedom, Operation Iraqi Freedom, and Dessert Storm/Shield. Of the participants, 32 had a diagnosis of Major Depressive Disorder (MDD). For their analysis, PTSD was defined by total symptom severity, PTSD re-experiencing, avoidance, and hyper arousal clusters. The researchers found that MDD did have a

significant influence on the relationship between PTSD and state anger. The numbing and dysphoria clusters of PTSD mainly influenced trait anger. The authors concluded that in veterans with PTSD, posttraumatic symptomology could increase the levels of negative affect and lead to the symptoms of depression reaching clinical levels of MDD, which could in turn lead to increased anger. Along with impacting PTSD as shown in the current study, depression also has an effect on chronic pain. In the next section, the connection between depression and chronic pain will be discussed.

# **Depression and Chronic Pain**

In clinical settings, depression and chronic pain have been noted as co-occurring disorders. Banks and Kerns (1996) conducted a study to examine the connection. As a part of their study, the authors looked at the literature on depression and the literature on many other chronic medical conditions. Their findings indicated that depression was more prevalent among chronic pain patients than among those patients who were suffering from other chronic medical conditions. Based on the findings of their review of the literature, the authors suggested a diathesis-stress framework as a way of understanding the connection between depression and chronic pain. As a part of this model, pain was linked directly with negative affect and negative cognition, thus making pain more likely to be linked with depressive symptoms (Banks & Kerns, 1996).

Previous research on depression and PTSD has shown that the two diagnoses are often comorbid. Lopez and colleagues (2013) studied the Beck Depression Inventory II (BDI-II) scores of veterans with chronic pain. The researchers' goal was to look at the somatic responding on the BDI-II by veterans who were suffering from chronic pain. Data was obtained from the archives of 345 male veterans who had enrolled for outpatient treatment. The authors found that

somatic complaints could lead to an over diagnosis of depression in veterans who were suffering from chronic pain (Lopez, Pierce, Gardner, & Hanson, 2013). Depression was utilized as a control variable in the current study due to the known links between depression, chronic pain, and PTSD. The goal of the present study was to identify the role of anxiety sensitivity in the connection between PTSD and chronic pain; this would not be possible without controlling for depression. In the next section, two theories are put forth as to the role of anxiety sensitivity in the comorbid experiencing of PTSD and chronic pain.

#### Anxiety Sensitivity in Comorbid Chronic Pain and PTSD

Seminal theories. There are two main theories as to why PTSD and chronic pain tend to co-occur. The first theory put forth by Sharp and Harvey (2001) states that mutual maintenance may be the cause of the comorbidity. The second theory put forth by Asmundson and colleagues (2002) points to a shared vulnerability between the two diagnoses. Starting with Sharp and Harvey, this current study looked at the development of both theories. Sharp and Harvey (2001) found research on the co-occurrence of pain and PTSD to be minimal. The lack of research led some authors to believe that pain and PTSD might be connected rather than each being a separate disorder. Sharp and Harvey cited four studies that led to this conclusion (Beckham et al., 1997; Benedict & Kolb, 1986; Bryant, Marosszeky, Crooks, Baguley, & Gurka, 1999; McFarlane, Atchison, Rafalowicz, & Papay, 1987).

**Mutual maintenance theory.** Based on the idea that pain and PTSD are not mutually exclusive, Sharp and Harvey (2001) proposed the theory of mutual maintenance as a way of describing the connection between the two diagnoses. In their theory, Sharp and Harvey put forth seven different avenues through which mutual maintenance may occur. The first avenue included attentional and reasoning biases. For patients who have a PTSD diagnosis, pain may not only

cause physical distress, it may serve to remind them of the emotional trauma they have endured which could make the experiencing of pain worse (Bryant, Marosszeky, Crooks, Baguley, & Gurka, 1999). The second possible link between pain and PTSD is the role of anxiety sensitivity. Anxiety sensitivity involves misinterpreting anxiety symptoms as indicative of harm; this in turn may lead to a misinterpretation of physical sensations involved in pain (McFarlane, Atchison, Rafalowicz, & Papay, 1987). Based on research done by Blanchard and colleagues (1986), the third possible connection is the role of trauma reminders in the triggering of symptoms. If pain reminds the victim of the trauma, they will avoid pain, thus avoiding reminders of the trauma they experienced. Avoidance was suggested as the fourth possible connection between pain and PTSD. In both disorders, cognitive avoidance has been found to lead to the maintenance of symptoms. In pain patients, cognitive avoidance can lead to deconditioning and disability and in PTSD patients, cognitive avoidance can lead to a person not dealing with a traumatic situation and thus lessening the impact of the situation (Foa, Steketee, Rothbaum, 1989; Waddell, Newton, Henderson, Somerville, & Main, 1993). The fifth possible connection Sharp and Harvey proposed was the role of depression. The lethargy associated with depression can lead to inactivity which can lead to a person not processing their trauma symptoms effectively (Foa, Steketee, Rothbaum, 1989; Waddell, Newton, Henderson, Somerville, & Main, 1993). The sixth possible connection includes the role of pain perception. Research completed by Difede and colleagues (1997) found that pain perception is increased by anxiety. Since anxiety is a symptom of PTSD, one could assume that PTSD could also increase the perception of pain. The seventh and final link proposed by Sharp and Harvey is the lack of attentional control found in those suffering from pain and PTSD. Pain patients tend to have catastrophic thoughts about their pain. PTSD patients tend to also have negative thoughts regarding their trauma. For those who have

been dually diagnosed with PTSD and chronic pain, these constant negative thoughts can impede their brains' ability to cognitively process the two diagnoses (Crombez, Eccleston, Beayens, & Eelen, 1998; Harvey & McGuire, 2000). This theory incorporates the cognitive, affective, and behavioral components of chronic pain which may serve to exacerbate the symptoms of PTSD. Next, this study will look at another theory that also involves the role of anxiety sensitivity in the comorbid experiencing of PTSD and pain.

Shared vulnerability theory. The other prominent theory as to why pain and PTSD often co-occur was offered by Asmundson and colleagues. Asmundson and colleagues (2002) proposed that those who are diagnosed with PTSD and pain have a shared vulnerability for the two disorders. Although other factors have been considered to explain the connection, anxiety sensitivity has proven to be the most fruitful (Asmundson, Coons, Taylor, & Katz, 2002). Anxiety sensitivity involves the fear of anxiety symptoms based on the possibility that the symptoms themselves may have harmful consequences (Asmundson, Coons, Taylor, & Katz, 2002; Reiss & McNally, 1985; Taylor, 1999). Research has uncovered three dimensions of anxiety sensitivity including fear of having an anxiety reaction in public, fear of losing control of thoughts, and fear of painful sensations around the experiencing of anxiety (Taylor, 1999). To illustrate what anxiety sensitivity might look like, Asmundson and colleagues (2002) gave the example of someone who was experiencing shortness of breath and rapid heartbeat as a part of a panic reaction, thinking that they were actually having a heart attack. In short, anxiety sensitivity is not the fear of a particular object or event; it is the fear of one's reaction to a particular object or event.

Fedoroff and Colleagues (2000) looked at the relevance of cognitive factors such as anxiety sensitivity and thoughts related to trauma in predicting whether or not someone would

develop PTSD. The participants were 81 individuals who had been involved in motor vehicle accidents. The participants completed self-report questionnaires regarding their symptoms of pain and PTSD and their thoughts about their accidents. A regression analysis was conducted and the results indicated that anxiety sensitivity and pain severity were significant predictors of PTSD symptoms. The participants' thoughts about their accidents were not found to be indicative of their later developing symptoms of PTSD. The results of this study suggest that anxiety sensitivity is a significant risk factor for the exacerbation and maintenance of PTSD symptoms.

Asmundson and colleagues (2000) also conducted a study to look at chronic pain and PTSD. The researchers sampled 115 patients who were experiencing chronic pain. Of those sampled, 14 were classified as dysfunctional, 21 were classified as interpersonally distressed, and 47 were classified as minimizing adaptive copers. The participants in this study completed a pain inventory, anxiety inventory, fear questionnaire, and a depression inventory. The results showed that patients who experienced pain in a way that was considered dysfunctional were more likely to have elevated levels of anxiety sensitivity and were more likely to have a diagnosis of PTSD. Based on this evidence, Asmundson concluded that increased levels of anxiety sensitivity could plausibly predate the development of both pain and PTSD symptoms; the researchers posited that when people who have high levels of anxiety sensitivity are faced with a trauma experience or a painful physical reaction, or some combination thereof, they are more likely to respond with more intense emotion than would someone with lower levels of anxiety sensitivity (Asmundson, Coons, Taylor, & Katz, 2002).

Jakupcak and colleagues (2006) conducted the only previous study examining the role of anxiety sensitivity in the comorbid experiencing of pain and PTSD. In the Jakupcak study,

anxiety sensitivity and depression were investigated as co-predictors of PTSD and chronic pain. The participants were 53 men who presented for evaluation and treatment for PTSD at VA Puget Sound Health Care System. All those chosen to be a part of the study had a diagnosis of PTSD as defined by the DSM-IV. A medical chart review was conducted to ascertain whether the veterans in the sample had rates of chronic pain that were comparable to those previously found in veterans seeking help for PTSD. Participants qualified as having chronic pain if they had a history of chronic pain diagnosis or if they were diagnosed with pain symptoms by one of the medical professionals at the PTSD clinic.

Three separate measures were utilized to assess anxiety sensitivity, PTSD symptom severity, and depression; they were the Bodily Sensations Questionnaire (BSQ), The Mississippi Scale for Combat-Related PTSD (M-PTSD), and the Patient History Questionnaire (PHQ), respectively. Depression was assessed using the 9-item depression subscale on the PHQ. The 13item somatic subscale of the PHQ was utilized to measure somatic symptoms. The study found that PTSD symptom severity, depression symptom severity, and anxiety sensitivity were each positively and significantly related to veterans' self-reported severity of somatic complaints. Further, a hierarchical regression analysis indicated that anxiety sensitivity and depression severity accounted for the relationship between PTSD and veterans' somatic complaints (Jakupcak et al., 2006).

## Conclusion

Because anxiety sensitivity has been implicated in the connection between pain and PTSD in both of the seminal theories on the topic, this study examined the role of anxiety sensitivity in the comorbidity between pain and PTSD. To date, only one other study has been completed to empirically test this connection. Jakupcak and colleagues (2006) studied male

veterans who were seeking inpatient care for their PTSD symptoms to see if the relationship between pain and PTSD symptoms could be accounted for by a combination of depression and anxiety sensitivity. This study found that anxiety sensitivity and depression severity do play a part in the relationship between veterans' experiencing of PTSD and pain, which the authors suggest means that PTSD influences pain through underlying symptoms of anxiety sensitivity and depression. However, Jakupcak's study did not distinguish between the effects of anxiety sensitivity and the effects of depression on the comorbid experiencing of PTSD and chronic pain. For the current study, depression was utilized as a control variable. The goal of the present study was to isolate the role of anxiety sensitivity in the comorbid experiencing of PTSD and PTSD. Understanding the way in which anxiety sensitivity affects the co-occurrence of PTSD and pain would allow treatment options to be more directly targeted and therefore more effective in treating comorbid PTSD and pain.
### **Chapter 3: Methods**

Due to the dearth of research on the connection between pain and PTSD, the following research question was posed: Does anxiety sensitivity influence the experiencing of pain and PTSD when depression is controlled for? In this chapter, a review of the current study's hypotheses will be provided, along with the statistical analyses that were conducted to confirm or disconfirm the hypothesis.

Jakupcak and colleagues (2006) studied veterans seeking inpatient care for their PTSD symptoms to determine if a combination of depression and anxiety sensitivity could account for the relationship between pain and PTSD symptoms. The present study differed from that done by Jakupcak and colleagues in a number of ways. First, anxiety sensitivity and depression were separated. The current study controlled for depression as a way of isolating the effects of anxiety sensitivity on the comorbid experiencing of PTSD and pain. Further, different measures were utilized to assess each of the variables involved in the study. In the current study, depression was used as a control variable. The goal of the current study was to discern the impact of anxiety sensitivity on PTSD and pain when depression was controlled for.

The following research question and hypothesis was proposed: *Does anxiety sensitivity have a significant effect on the comorbid experiencing of pain and PTSD when depression is controlled for? It is hypothesized that, even when depression is controlled for, anxiety sensitivity will still have a significant impact on the comorbid experiencing of pain and PTSD.* 

For the current study, the BSQ was replaced by the Anxiety Sensitivity Index-3 (ASI-3) as the assessment for anxiety sensitivity because the BSQ was developed for and normed on individuals who suffered from agoraphobia (Chambless, Caputo, Bright, & Gallagher, 1984). Whereas some of the participants in the current study may exhibit symptoms of agoraphobia, for

others this assessment of anxiety sensitivity would be invalid. The ASI-3 has demonstrated reliability in predicting symptoms of anxiety sensitivity in a community population (Taylor et al., 2007; physical concerns  $\alpha$ =.79; cognitive concerns  $\alpha$ =.84, social concerns  $\alpha$ =.79 in the present study) and in a veteran population (Englehard, Olatunji, & de Jong, 2010;  $\alpha$ =.73 in the present study). The Posttraumatic stress disorder Checklist-Military Version (PCL-M) was utilized as it is a psychometrically sound screening measure for PTSD. Finally, the West Haven-Yale Multidimensional Pain Inventory (WHYMPI) was utilized as the pain inventory in the current study because it is a much more extensive assessment of pain than the 13-item subscale of the PHQ. Each of the measures for the current study mentioned above will be discussed in more detail.

# **Participants**

Participants were male and female United States military veterans who self-reported symptoms of PTSD and Chronic Pain.

## Procedure

**Participant recruitment.** Once approval for this study was obtained from Radford University's Internal Review Board (IRB), the participant recruitment process began. Initial Recruitment efforts were concentrated within Veterans Administration (VA) hospitals in Virginia and Tennessee through emails with hospital administrators to obtain permission to contact the veterans who were receiving treatment from the VA. Unfortunately, the researchers were unable to gain access to potential participants through the VA hospital system; therefore a second round of recruitment efforts was conducted through veterans' organizations outside of the VA hospital system. Among the organizations contacted were the Virginia Employment Commission Veterans' Representative, the Wounded Warrior Project, Radford University

Military Resource Center, East Tennessee State University Office of Veterans' Affairs, King University Military Resource Center, and various VFW posts across Southwest Virginia and Northeast Tennessee.

As the population in the current study was difficult to access, chain sampling, a technique that has been identified as a valid way of gaining access to hard to reach populations, was utilized (Patton, 2002). Chain sampling involves one person or organization being made aware of a study and then being asked to spread the information about the study to other interested parties. Once permission was obtained, individual veterans learned of the study by word of mouth from representatives of the various organizations contacted and through fliers placed in common areas of the respective veterans' organizations locations.

The survey was administered via Qualtrics Survey Software. Participants were provided with informed consent about their role as participants in the study and given the option to accept or decline participation in the study. If the participant opted to decline to take the survey, they were redirected to a thank you page. If the participant chose to complete the survey, they were shown the survey items. At the end of the survey, the participants were given the option of providing their email address to be entered to win a \$50 Amazon gift card. If they chose to provide their email, they were redirected to a page to do so. If they declined to provide their email address, they were redirected to a thank you page.

### Measures

Respondents completed an informed consent document (Appendix A) and five measures. The measures included: Demographic questionnaire (Appendix B), Anxiety Sensitivity Index-3 (Appendix C), Beck Depression Inventory-II (Appendix D), The Posttraumatic stress disorder

Checklist- Military Version (Appendix E), and the West Haven-Yale Multidimensional Pain Inventory (Appendix F).

**Demographic information questionnaire.** The demographic questionnaire was designed by the researcher and was used to obtain biographical information about the research participants. Included in the questionnaire were questions pertaining to age, gender, ethnicity, years in service, branch(es) of service, number of deployments, and whether or not the participant had seen combat. See appendix B for a complete list of questions.

Anxiety Sensitivity Index-Three. The Anxiety Sensitivity Index-Three (ASI-3), an 18 item scale made up of three parts measuring physical, cognitive, and social concerns related to the experiencing of anxiety sensitivity, was administered to the participants. This index has a resilient three-factor structure that holds true across gender, country, language, and clinical vs. non-clinical subjects. When evaluating the reliability and internal consistency of this study, Taylor and colleagues (2007) determined that coefficients greater than or equal to .70 would be considered acceptable and those greater than .80 would be defined as good. The values for the ASI-3 (physical concerns  $\alpha$ =.79; cognitive concerns  $\alpha$ =.84, social concerns  $\alpha$ =.79) all fall in the range of acceptable or good, making it an adequate research tool (Taylor et al., 2007). The ASI-III has been utilized effectively with community samples (Berenz, Vujanovic, Coffey, & Zvolensky, 2012,  $\alpha$ =.94 in the present study; Carleton, Peluso, Collimore, & Asmundson, 2011,  $\alpha$ =.92 in the present study). The ASI-III has also been used reliably with a veteran sample (Elgehard, Olantunji, & de Jung, 2011;  $\alpha$ =.73 in the present study).

**Beck Depression Inventory II.** The Beck Depression Inventory- II (BDI-II) (Beck, Steer, & Brown, 1996), a 21-item self-report measure that assesses symptoms of depression experienced during the past week, was administered to the participants. The BDI-II has

consistently been shown to be both valid and reliable in assessing depression in multiple populations (Beck, Steer, & Brown, 1996). The BDI-II was chosen as the measure of depression for this study due to the fact that it has been utilized effectively with veterans (Lopez, Pierce, Gardner, & Hanson, 2013,  $\alpha$ =.92 in the present study).

The Posttraumatic Stress Disorder Checklist- Military Version. The Posttraumatic Stress Disorder Checklist (PCL) is the most commonly used self-report measure of PTSD symptoms (McDonald & Calhoun, 2010). There are three versions of the PCL, the PCL-C (civilian), the PCL-S (specific), and the PCL-M (military) (Wilkins, Lang, & Norman, 2011). For the purpose of the current study, the focus was on the PCL-M. The PCL-M was developed with a sample predominantly made up of male theater of war (Vietnam and Gulf) veterans. The PCL-M can identify the symptom profile and whether the appropriate algorithm of DSM-IV symptoms have been met (Forbes, Creamer, & Biddle, 2001). The PCL-M is a 17-item inventory used to assess the specific symptoms of PTSD. Participants rate how much the described problem in each statement has bothered them over the past month on a five-point scale from (1) not at all to (5) extremely. The time frame can be changed to accommodate the goals of research studies. The PCL takes between 5 and 10 minutes to complete. PTSD symptom severity is determined by a total score. The total symptom severity range covered on the PCL-M is 15 to 85. The proposed cutoff score for a military population is 50. If a veteran scores 50 or above on the PCL-M, they would meet DSM-IV criteria for PTSD (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weather, Litz, Herman, Huska, & Keane, 1993).

The West Haven-Yale Multidimensional Pain Inventory. The West Haven-Yale Multidimensional Pain Inventory (WHYMPI), a fifty-two item inventory made up of three parts, all containing subscales, was also administered to the participants. The first part of the inventory

evaluates five important parts of the pain experience; patients' perception of pain's interference in various areas of their functioning, support and concern from significant others, pain severity, self-control, and negative mood. The second part evaluates the response of significant others to communications about pain. Three subscales associated with the second part are perceived frequency of punishing, solicitous, and distracting responses. The third part assesses the patient's report of their participation in four categories of daily activities; household chores, outdoor work, activities away from home, and social activities. In the development of this measure, 120 chronic pain patients who were referred to the chronic pain program at the West Haven, CT VA Medical center were sampled. The reliability estimates for all scales appear to be satisfactory, ranging from .70 to .90. The stability coefficients were in the .62-.91 range, indicating that a substantial proportion of the reliable variance in the scales remained stable over time. The intercorrelations between the scales range from .00 to .58, indicating that each scale is distinct and reliable. All reliability estimates were for the current study (Kerns, Turk, & Rudy, 1985).

Due to the dearth of research on the connection between pain and PTSD, the following research question was posed: Does anxiety sensitivity influence the experiencing of pain and PTSD when depression is controlled for? In this chapter, a review of the current study's hypotheses will be provided, along with descriptive statistics of the individuals who participated in the study. Additionally, statistical analyses that were conducted to confirm or disconfirm the hypothesis are outlined.

## Hypothesis

Based on the available literature, the researcher hypothesized that, even when depression was controlled for, anxiety sensitivity would have a significant impact on the comorbid experiencing of pain and PTSD. A number of measures were included to assess the variables of

interest. The West Haven-Yale Multidimensional Pain Inventory (WHYMPI), a 52-item inventory, was used to assess three dimensions of the experiencing of pain, the first dimension being the effect of pain on life satisfaction, the second dimension being the effect of pain on significant other relationships, and the third being the effect of pain on one's daily functioning (Kerns, Turk, & Rudy, 1985). The Posttraumatic Stress Disorder Checklist-Military Version (PCL-M), a 17-item measure, was used to determine participants' PTSD symptom severity (McDonald & Calhoun, 2010). To assess participant's experiencing of Anxiety Sensitivity, the Anxiety Sensitivity Index-Three (ASI-3), an 18-item scale was utilized (Taylor et al., 2007). Finally, the Beck Depression Inventory-Two (BDI-II), a 21-item measure, was employed to determine the severity of the participants' experiencing of symptoms of depression (Beck, Steer, & Brown, 1996).

In the current study, mediation was conducted utilizing the model put forth by Baron and Kenny (1986). The goal of mediation is to understand the mechanism through which the causal variable (X) affects the outcome variable (Y). The mediator variable (M) is presumed to cause the outcome of variable X on Y. In the current study, four separate mediations were examined. The researcher predicts that depression will partially mediate the experiencing of anxiety sensitivity and all three aspects of pain and PTSD.

### **Data Analysis**

Scores on the Anxiety Sensitivity Index-3, BDI-II, PCL-C, and the WHYMPI were calculated. Statistical analysis was conducted to test the degree to which depression mediates relationships between anxiety sensitivity and pain and between anxiety sensitivity and PTSD. The Baron and Kenny (1986) method for assessing the presence of mediation effects was used. The criteria needed to demonstrate mediation are outlined below.

**Testing mediation.** The four steps proposed by Baron and Kenny were utilized to evaluate the presence of mediation. The mediation hypothesis states that two variables are correlated through one or more mediating variables (1986). According to Baron and Kenny's mediational model, an independent variable X, for example, is related to a dependent variable Y through one or more additional variables. Four separate mediation analyses were conducted assessing the degree to which depression mediates the relationship between anxiety sensitivity and each of four outcome measures of pain and PTSD symptomatology.

Each mediation analysis involves a series of four steps. The first step utilizes a regression equation to show that the independent variable (X) is correlated with the outcome variable (Y). The second step utilizes another equation to show that the causal variable (X) is correlated with the mediator variable (M). For the third and fourth step, a single regression equation is utilized in which both the independent variable (X) and the mediator variable predict scores for the dependent variable (Y). Step three is conducted by determining whether the mediator variable is a statistically significant predictor of the dependent variable when the independent variable is included as a second predictor. Step four is conducted by determining whether the standardized regression coefficient for the independent variable drops to zero or close to zero when the mediator variable is included as a second predictor. If the effect of X on Y, when M is controlled for, is zero, then complete mediation is said to have occurred (Baron and Kenny, 1986). If the standardized regression coefficient does not drop to zero but is reduced significantly in size, partial mediation is said to be present. Partial mediation was evaluated using the Sobel Test.

### **Chapter 4: Results**

## **Descriptive Analysis**

**Participants.** Participants were male and female United States military veterans who self-reported symptoms of PTSD and Chronic Pain. The participants in the study represented six branches of the military. Twenty-six participants reported they had served in the Army, six participants reported serving in the Navy, two participants reported serving in the Marines, five participants reported serving in the Air Force, one participant reported serving in the reserves, and two participants reported serving in the National Guard. Twenty-seven of the participants reported they had seen combat, while sixteen participants indicated they had not seen combat. Seventeen participants reported serving between zero and five years, ten participants had served from six to ten years, seven participants reported serving between eleven and fifteen years, five participants reported serving between sixteen and twenty years, and three participants reported serving between twenty-six and thirty years. Of those completing the survey, the mean number of deployments was 1.88 (SD = 2.090, Mdn= 1).

## Measures

Respondents in this study were asked to complete four measures. These measures were the West Haven-Yale Multidimensional Pain Inventory (WHYMPI), the Posttraumatic Stress Disorder Checklist-Military (PCL-M), the Anxiety Sensitivity Index-Three (ASI-3), and the Beck Depression Inventory-Two (BDI-II). Each scale yields a total score which allows the responses to be compared to one another and allows for calculation of the mean scores for a given measure.

**West Haven-Yale Multidimensional Pain Inventory (WHYMPI).** Scores for the WHYMPI range from 0 to 6, with 0 indicating no symptoms and 6 indicating an extreme level of

symptoms. For the purposes of the current study the WHYMPI was divided into three subscales, including the effects of pain on life satisfaction, the effects of pain on significant other relationships, and the effects of pain on one's daily functioning. The scores for each subscale were as follows: the effects of pain on everyday living (M=3.86, SD=1.14), the effects of pain on significant other relationships (M=2.99, SD=0.83), and the effects of pain on one's daily functioning (M=3.39, SD=.99).

**The Posttraumatic Stress Disorder Checklist-Military Version (PCL-M).** Scores for the PCL-M range from 1 to 5, with 1 indicating no symptoms and 5 indicating an extreme level of symptoms. The scores of the participants on the PCL-M (M=42.76, SD=17.02) on average fell within the clinical range for posttraumatic stress disorder, between 30 and 50.

Anxiety Sensitivity Index-Three (ASI-3). Scores for the ASI-3 range from 1 to 5, measuring symptom severity from very little to very much. The scores on the ASI-3 (M=40.8, SD=17.74) on average were slightly higher than those observed in other clinical populations, including individuals diagnosed with panic disorder, obsessive compulsive disorder (OCD), social phobia, generalized anxiety disorder (GAD), specific phobia, and those with health anxiety.

The Beck Depression Inventory-II (BDI-II). Scores for each individual question on the BDI-II range from 0 to 3, with 0 indicating no experiencing of a certain symptom and 3 indicating extreme experiencing of a certain symptom. In two cases, the questions regarding sleeping and appetite, the score ranges are slightly different. The scores range from 0 to 3, with 0 indicating that the participant does not experience the symptom in question and 3 indicating extreme experiencing of the symptom in question; however, on these two questions the participant has two choices to indicate how they are experiencing a certain symptom. For

instance, with the appetite question, the participant may be feeling the need to eat too much or not be feeling the need to eat at all, either of which would be problematic. Likewise, on the question regarding sleep, the participant might not be sleeping at all or they may be sleeping too much. On these two questions, the participant was asked to choose their symptom severity level and then option a or b to indicate which type of symptom they are experiencing. On the BDI-II the scores (M=42.34, SD=15.62) indicated that the sample overall are experiencing symptoms in the severe depression range.

#### **Mediation Analyses**

For the current study, four separate mediation analyses were conducted. The first mediation analysis was conducted to examine the ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on life satisfaction. The second mediation analysis was conducted to examine the ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on significant other relationships. The third mediation analysis was conducted to examine the ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on significant other relationships. The third mediation analysis was conducted to examine the ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. The fourth and final mediation analysis was conducted to examine the ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. The fourth

Mediation #1: The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on life-satisfaction. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (effects of pain on life-satisfaction) was assessed through a regression analysis predicting the effects of pain on life satisfaction from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .42$ ) was significantly different from zero, t(42) = 2.94, p

< .01. This satisfies the first of four criteria identified by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis predicting depression from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .62$ ) was significantly different from zero, t(42) = 5.04, *p* < .01. This satisfies the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (the effects of pain on life-satisfaction) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .46) in this multiple regression equation was significantly different from zero, t(42) = 2.70, *p* = .010. This satisfies the third criterion for demonstrating mediation by establishing that depression contributes significantly to a regression model that includes both depression and anxiety sensitivity.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta$ =.14) was not significantly different from zero, t(42) = .809, *p* = .423, indicating that a case for full mediation can be made, even though the value for beta does not drop all the way to zero.

The presence of a significant Sobel Test (Z = 2.39, p = .016) indicates that the strength of the relationship between anxiety sensitivity and life satisfaction is weakened significantly when

depression is added to a regression model predicting scores for life satisfaction. This satisfies the criterion for demonstrating partial mediation.

Mediation #2: The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on significant other relationships. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable (effects of pain on significant other relationships) was assessed through a regression analysis predicting the effects of pain on significant other relationships from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .16$ ) was not significantly different from zero, t(41) = 1.04, p = .303. Due to this finding, mediation could not be completed because the first step of Baron and Kenny's model was not satisfied.

Mediation #3: The ability of depression to mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (the effects of pain on daily functioning) was assessed through a regression analysis predicting the effects of pain on daily functioning from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta$ =-.44) was significantly different from zero, t(42) = -3.09, *p* < .01. This satisfies the first of four criteria identified by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis predicting depression from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta = .62$ ) was significantly different from zero, t(42) = 5.04, *p* 

< .01. This satisfies the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (the effects of pain on daily functioning) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .-.34) in this multiple regression analysis was significantly different from zero, t(42) = -1.98, *p* = .054. This satisfies the third criterion for demonstrating mediation by demonstrating that depression contributes significantly to a regression model that includes both depression and anxiety sensitivity in the equation.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta = -.22$ ) was not significantly different from zero, t(42)= -1.29, p = .206, indicating that a case for full mediation can be made. Even though anxiety sensitivity did not remain significant in the model it still accounts for approximately 3% of the variability in scores for the effects of pain on daily function.

The presence of a marginally significant Sobel Test (Z = -1.87, p = .062) indicates that the strength of the relationship between anxiety sensitivity and the effects of pain on daily functioning is weakened significantly when depression is added to a regression model predicting scores for the effects of pain on daily functioning. This satisfies the criterion for partial mediation. Mediation #4: The ability to mediate the relationship between anxiety sensitivity and Posttraumatic Stress Disorder (PTSD). The strength of the relationship between the independent variable (anxiety sensitivity) and the dependent variable in the analysis (PTSD) was assessed through a regression analysis predicting PTSD from anxiety sensitivity. The beta weight (standardized regression coefficient) for anxiety sensitivity ( $\beta$ =.56) was significantly different from zero, t(42)= 4.35, p <.01. This satisfies the first of four criteria by Baron and Kenny (1986) as required to demonstrate mediation.

The strength of the relationship between the independent variable (anxiety sensitivity) and the mediator variable in the analysis (depression) was assessed through a regression analysis predicting depression from anxiety sensitivity. The beta weight (standard regression coefficient) for anxiety sensitivity ( $\beta = .62$ ) was significantly different from zero, t(42)= 5.04, p < .01. This satisfies the second Baron and Kenny (1986) criterion required to demonstrate mediation.

A third regression analysis was conducted in which scores for the dependent variable (PTSD) were predicted by scores for both the independent variable (anxiety sensitivity) and the mediator variable (depression). The beta weight for the mediator variable (depression) ( $\beta$  = .63) in this multiple regression equation was significantly different from zero, t(42)= 4.75, *p* < .01. This satisfies the third criterion for demonstrating mediation by demonstrating that depression contributes significantly to a regression model that includes both depression and anxiety sensitivity in the equation.

The fourth Baron and Kenny (1986) criterion for demonstrating mediation was assessed by examining the beta weight for the independent variable (anxiety sensitivity) when the mediator variable (depression) was also included in the regression model. The beta weight for anxiety sensitivity ( $\beta = .17$ ) was not significantly different from zero, t(42) = 1.28, p = .207,

indicating that a case for full mediation can be made. Again, even though anxiety sensitivity did not remain significant in the model it still accounts for approximately 5% of the variability in scores for the effects of pain on daily function.

The presence of a significant Sobel Test (Z = 3.53, p < .001) indicates that the strength of the relationship between anxiety sensitivity and PTSD is weakened significantly when depression is added to a regression model predicting scores for PTSD. This satisfies the criterion for demonstrating partial mediation.

## **Summary of Findings**

Four separate mediation analyses were attempted. The first examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on life satisfaction. The second examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on significant other relationships, the third examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on daily functioning, and the fourth and final mediation analysis examined whether or not depression mediated the relationship between anxiety sensitivity and posttraumatic stress disorder. Baron and Kenny's mediation model was utilized to test mediation.

For the first mediation examined, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on life satisfaction. This indicates that the strength of the relationship between anxiety sensitivity and the effects of pain on life satisfaction was weakened significantly once the relationship between depression and the effects of pain on life satisfaction were taken into account. When both depression and anxiety sensitivity were employed as predictor variables, anxiety sensitivity did not contribute significantly to the regression equation predicting the effects of pain on life satisfaction. Depression, however, did

contribute significantly to a regression equation predicting the effects of pain on life satisfaction when anxiety sensitivity was also included in the regression model. This set of findings is not consistent with the hypothesis that anxiety sensitivity would accounted for a significant amount of variability in this dependent measure after controlling for self-reported levels of depression.

The second mediation examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on significant other relationships. This mediation analysis could not be completed because a significant relationship was not found between anxiety sensitivity and the effects of pain on significant other relationships. The criterion specified in Step 1 of Baron and Kenny's (1986) approach to testing mediation was not met. In other words, for this dependent variable, there was no relationship between the independent and dependent variables to mediate. This result is also inconsistent with the hypothesis that a significant relationship between anxiety sensitivity and the effects of pain on significant other relationships would be observed after controlling for levels of depression. A mediation analysis is utilized to determine the extent of a relationship between two variables (in this case anxiety sensitivity and the effects of pain on significant other relationships), when a third variable (in this case depression), is added to equation.

For the third mediation analysis, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. This result indicates the strength of the relationship between anxiety sensitivity and the effects of pain on daily functioning was reduced substantially when depression was used as a mediating variable. Because the standardized regression coefficient for anxiety sensitivity was not still significantly different from zero when depression was included as a second predictor the result is inconsistent with the major hypothesis for this analysis. After depression has been accounted for, anxiety

sensitivity still accounts for 3% of the variability in the dependent variables. Therefore, anxiety sensitivity maintains a small, yet noticeable, effect after depression has been accounted for.

The fourth, and final, mediation analysis found that depression fully mediated the relationship between anxiety sensitivity and PTSD. Anxiety sensitivity did not contribute significantly to a regression model that included depression as a second predictor variable. This result is inconsistent with the major hypothesis for this analysis. As with the previous analysis, after depression was accounted for, anxiety sensitivity still accounted for 4% of the variability in the dependent variables. If the sample size had been larger, the contribution of 4% would have reached statistical significance. Also, as with the previous analysis anxiety sensitivity maintained a small but noticeable effect after depression was used as a control variable.

#### **Chapter 5: Discussion**

The focus of the current study was to examine the relationship between anxiety sensitivity and chronic pain and posttraumatic stress disorder (PTSD), when depression was controlled for. Analysis was conducted to examine the mediating effect of depression on the experiencing of anxiety sensitivity, chronic pain, and PTSD.

A previous study by Jakupcak and colleagues (2006) examined the role of anxiety sensitivity and depression in the comorbid experiencing of pain and PTSD in an inpatient veteran population. In that study, a pre-collected data set was utilized along with a medical chart review to determine if the participants in the study were experiencing pain and PTSD. The researchers also utilized a series of questionnaires to assess anxiety sensitivity, PTSD symptom severity, and depression and somatic complaints. The authors found that both depression and anxiety sensitivity were underlying factors in the comorbid experiencing of pain and PTSD (Jakupcak et al., 2006).

The present study differed markedly from that completed by Jakupcak and colleagues. For the present study the veteran participants self-identified as experiencing both pain and symptoms of trauma. The participants completed screening questionnaires to assess their symptoms of pain and PTSD and also to assess for potential symptoms of anxiety sensitivity and depression. A further difference between the Jakupcak study and the present study was the use of different measures to examine the variables in question. The hypothesis of the current study was that anxiety sensitivity would still have a significant impact on the comorbid experiencing of pain and PTSD when depression was utilized as a control variable.

## Findings

For the first mediation examined, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on life satisfaction. This indicated that the strength of the relationship between anxiety sensitivity and the effects of pain on life satisfaction was weakened significantly once the relationship between depression and the effects of pain on life satisfaction were taken into account. When both depression and anxiety sensitivity were employed as predictor variables, anxiety sensitivity did not contribute significantly to the regression equation predicting the effects of pain on life satisfaction. Depression, however, did contribute significantly to a regression equation predicting the effects of pain on life satisfaction when anxiety sensitivity was also included in the regression model. This set of findings is not consistent with the hypothesis that anxiety sensitivity would accounted for a significant amount of variability in this dependent measure after controlling for self-reported levels of depression.

The second mediation examined whether or not depression mediated the relationship between anxiety sensitivity and the effects of pain on significant other relationships. This mediation analysis could not be completed because a significant relationship was not found between anxiety sensitivity and the effects of pain on significant other relationships. The criterion specified in Step 1 of Baron and Kenny's (1986) approach to testing mediation was not met. In other words, for this dependent variable, there was no relationship between the independent and dependent variables to mediate. This result is also inconsistent with the hypothesis that a significant relationship between anxiety sensitivity and the effects of pain on significant other relationships would be observed after controlling for levels of depression. A mediation analysis is utilized to determine the extent of a relationship between two variables (in

this case anxiety sensitivity and the effects of pain on significant other relationships), when a third variable (in this case depression), is added to equation.

For the third mediation analysis, depression was found to fully mediate the relationship between anxiety sensitivity and the effects of pain on daily functioning. This result indicates the strength of the relationship between anxiety sensitivity and the effects of pain on daily functioning was reduced substantially when depression was used as a mediating variable. Because the standardized regression coefficient for anxiety sensitivity was not still significantly different from zero when depression was included as a second predictor the result is inconsistent with the major hypothesis for this analysis. After depression has been accounted for, anxiety sensitivity still accounts for 3% of the variability in the dependent variables. Therefore, anxiety sensitivity maintains a small, yet noticeable, effect after depression has been accounted for.

The fourth, and final, mediation analysis found that depression fully mediated the relationship between anxiety sensitivity and PTSD. Anxiety sensitivity did not contribute significantly to a regression model that included depression as a second predictor variable. This result is inconsistent with the major hypothesis for this analysis. As with the previous analysis, after depression was accounted for, anxiety sensitivity still accounted for 4% of the variability in the dependent variables. If the sample size had been larger, the contribution of 4% would have reached statistical significance. Also, as with the previous analysis anxiety sensitivity maintained a small but noticeable effect after depression was used as a control variable.

## Limitations

The most notable limitation of the current study was the modest sample size. This resulted in insufficient statistical power available to detect the small, but non-trivial contribution of anxiety sensitivity to regression models predicting scores for both the effects of pain on daily

functioning and the presence of PTSD symptoms. With the available sample size of 43 participants, values of power of .21 and .30 were present for analyses of the effects of pain on daily functioning and PTSD symptoms, respectively. According to calculations available through the \*GPower software, 253 participants would have been required to achieve statistical significance for the regression coefficient for anxiety sensitivity when predicting the effects of pain on daily functioning (.177). One-hundred-seventy-seven participants would have been required to achieve statistical significance for the regression coefficient for the regression coefficient for anxiety sensitivity when predicting the sensitivity when predicting the predicting the sensitivity when predicting the sensitivity when predicting PTSD symptoms.

A second study limitation is the lack of cultural diversity in the sample. Although the research survey was distributed through several veterans' organizations and online, only one non-Caucasian participant completed the survey. This could have been representative of the lack of diversity in the area in which much of the recruiting for the current research study was conducted. Whereas the study was open to individuals from any ethnicity, it is important to consider that the results may have been different if there had been more diversity in the sample.

Another limitation of the study was the diversity in the age range of the participants. The researcher chose to make the survey inclusive of all military veterans, without regard to age or era in which they served. This was a conscious decision by the researcher to obtain an overview of the effects of anxiety sensitivity on the co-morbid experiencing of chronic pain and PTSD in military veterans in general. Restricting the participant pool to veterans who served in specific eras might provide insight into the mediating effects of different types of combat or combat situations on the co-morbid experiencing of pain and PTSD.

The last notable limitation was the lack of equivalent depth of the PTSD measure as compared to the chronic pain measure. The PTSD measure provided an overview of PTSD

symptoms whereas the pain measure provided a more in-depth look at the specific experiences associated with the experiencing of pain. The PTSD measure utilized in the study, the Posttraumatic Stress Disorder Checklist-Military Version (PCL-M), although one of the most commonly used self-report measures of PTSD symptoms, did not provide the same depth of information on PTSD symptoms as the WHYMPI did for pain symptoms.

#### **Research Implications**

Further research should be conducted on the comorbid experiencing of pain and PTSD. As anxiety sensitivity and depression have been found to only partially mediate the relationship between anxiety sensitivity, the effects of pain on daily functioning, and PTSD, there is a need for more research to be conducted to determine what other mediating factors are involved in the relationship between anxiety sensitivity, pain, and PTSD. In their mutual maintenance theory, Sharp and Harvey (2001) proposed seven possible avenues through which pain and PTSD might be connected. As the current findings indicated that anxiety sensitivity partially mediated the experiencing of the three factors of pain and PTSD, even when depression was controlled for, it is highly probable that a number of other factors are contributing to the comorbidity of the two disorders.

Further studies should investigate the mutual maintenance theory. Researchers should test the other possible mediating factors proposed by Sharp and Harvey. To date, several mediating variables have received the attention of researchers; these include attentional and reasoning biases, trauma reminders, avoidance, pain perception, and lack of attentional control (Bryant, Marosszeky, Crooks, Baguley, & Gurka, 1999; Crombez, Eccleston, Beayens, & Eelen, 1998; Difede, Jaffee, Musngi, Perry, & Yurt, 1997; Foa, Steketee, & Rothbaum, 1989; Harvey and

McGuire, 2000; McFarlane, Atchison, Rafalowicz, & Papay, 1987; Waddell, Newton, Henderson, Somerville, & Main, 1993).

Because anxiety sensitivity was found to be associated with two of the aspects of pain in the study and PTSD, further research regarding how a person develops increased anxiety sensitivity would be helpful in starting the process of learning how to manage it. The literature provides several theories regarding why a person might experience increased anxiety sensitivity. Experiencing a panic attack has been put forth as a possible reason to explain increased anxiety sensitivity, due to the fear provoking symptoms associated with panic (Reiss, Peterson, Gursky, & McNally, 1986). Another theory posits that anxiety sensitivity can only be developed after one has experienced a panic attack (Goldstein & Chambless, 1978). A third theory as to the origins of anxiety sensitivity put forth by Reiss and colleagues (1986) is that anxiety sensitivity could occur as a result of conditioning. Future studies on how one develops increased anxiety sensitivity would be helpful in determining ways to manage anxiety sensitivity; researchers could test the elements of all three proposed theories in an attempt to help the field reach consensus.

Future research should explore treatment modalities that serve to decrease anxiety sensitivity in those veterans who are experiencing both pain and PTSD. This type of research explores how a decrease in anxiety sensitivity may decrease the likelihood of a veteran's suffering from comorbid pain and PTSD. The existing literature on anxiety sensitivity has focused on defining the construct of anxiety sensitivity but has not yet looked at ways to manage it. Studies that explore the implementation of interventions to aid in managing anxiety sensitivity within the veteran population would be beneficial to continue to expand the literature. Future research might examine whether proposed interventions for anxiety sensitivity served to further mediate the relationship between anxiety sensitivity and pain and PTSD.

# **Practical Applications**

The results of this study provide only limited support for the association of anxiety sensitivity with the experiencing of two of the aspects of pain covered in the study and PTSD, when depression was utilized as a control variable. Depression appears to have the more direct effect on the effects of pain and on PSTD symptomatology; however, anxiety sensitivity, in turn, appears to have a strong relationship with depression.

These results may be applied in a clinical setting in several ways. Effective treatment for depression may result in beneficial effects on both the effects of pain and PTSD; however, the results also suggest that targeting anxiety sensitivity may provide an alternative therapeutic route to treatment for depression that may, in turn, magnify the positive consequences for pain and PTSD. Theories as to the origin of increased anxiety sensitivity posit that the experiencing of a panic attack may be a causal factor (Goldstein & Chambless, 1978; Reis, Peterson, Gursky, & McNally, 1986). Should the clinician work to decrease veterans' depressive symptoms and anxiety symptoms, the likelihood of their experiencing co-morbid chronic pain and PTSD may be reduced.

#### Conclusion

The results of the current study found that no significant relationship between anxiety sensitivity and any of the outcome variables remained after controlling for depression. Anxiety sensitivity did account for 4% of the variability in the outcome measures for the effects of pain on daily living and PTSD. Had the sample size been larger, the contribution of anxiety sensitivity would have reached statistical significance. This research has added to the body of literature by examining a possible avenue through which chronic pain and PTSD might co-occur.

These preliminary findings regarding the role of anxiety sensitivity in the co-morbid experiencing of chronic pain and PTSD provide empirical support for practical therapeutic interventions. Clinicians working with veterans presenting with both chronic pain and PTSD can utilize evidence based treatments for anxiety and depression. Enhancing veterans' ability to cope with symptoms of depression and anxiety could serve as a protective factor against their experiencing both chronic pain and PTSD.

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## **Appendix A: Informed Consent**

The Role of Anxiety Sensitivity in the Comorbid Experiencing of Chronic Pain and Posttraumatic Stress Disorder in Veterans

## **Principle Investigator:**

Name: Dr. Ruth Riding-Malon Department: Psychology Address: Box 6946, Radford, Va. 24142 Phone: 540-831-6892 Email: rridingmalon@radford.edu

## Secondary Investigator:

Name: Sarah Lyall, MS Department: Psychology Address: Box 6946, Radford, Va. 24142 Email: selyall@radford.edu

## **Background:**

As a veteran in the United States military, you are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please take time to read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information.

#### The purpose of this study is:

The purpose of this study is to find out whether or not anxiety sensitivity plays a significant role in the comorbid experiencing of Posttraumatic Stress Disorder and Chronic Pain.

#### **Study Procedure:**

Your expected time commitment for this study is 30 minutes. To complete this study, you will be asked to complete a series of questions on a computer. The questions will measure demographic information, information about previous trauma experiences, information about your current level of pain, and finally questions will be asked to assess for depression.

#### **Risks:**

The risks of this study are minimal. The questions on the surveys will look similar to topics you would normally discuss with your doctor. For some, the topics in this survey could be upsetting. You may decline to answer any or all questions and you may terminate involvement in the study at any time if you choose to do so.

#### **Benefits:**

As a participant in the current study, you will be given the opportunity to enter to win a \$50 amazon gift card. Odds of winning will be based on the number of participants in the study, approximately 1:30. It is the hope of the researcher that the information obtained from this study may help in isolating one of the common factors leading to the co-occurrence of PTSD and chronic pain. Knowledge is power when it comes to treating both mental and physical health problems. The more that is known about the connection between PTSD and chronic pain, the more that can be done in developing effective treatment options.

## **Confidentiality:**

Participant data will be kept confidential; the survey does not require identifying information from participants except for requesting an email contact address for participants who wish to be entered into the drawing to win the \$50 Amazon gift card. The email address will be stripped from the data set immediately after downloading the data from the survey site and used only for the purpose of the gift card drawing.

## **Person to Contact:**

Should you have any questions about the research or any related matters, please contact Sarah Lyall at (selyall@radford.edu).

## **Institutional Review Board:**

This study has been approved by the Radford University Institutional Review Board for the Review of Human Subjects Research. If you have questions or concerns about your rights as a research subject or have complaints about this study, you should contact Dr. Dennis Grady, Dean, College of Graduate and Professional Studies, Radford University, dgrady4@radford.edu, 1-540-831-7163.

## **Voluntary Participation:**

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you do decide to take part in this study, you will be asked to sign a consent form. If you decide to take part in this study, you are still free to withdraw at any time and without giving a reason. You are free to not answer any question or questions if you choose. This will not affect the relationship you have with the researcher or Radford University.

#### **Unforeseeable Risks:**

There may be risks that are not anticipated. However every effort will be made to minimize any risks.

#### **Costs to Subject:**

There are no costs to you for your participation in this study.

#### **Compensation:**

There is no monetary compensation to you for your participation in this study.

## **Consent:**

By clicking yes below, I confirm that I have read and understood the information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason and without cost. I voluntarily agree to take part in this study.

Signature	Date
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## **Appendix B: Demographics**

 Age (number in years)\_\_\_\_\_
 Gender: (check one) male\_\_\_\_\_ female\_\_\_\_ other\_\_\_\_\_
 Ethnicity: (check all applicable) African-American\_\_\_\_\_ Asian-American/Pacific Islander\_\_\_\_\_ American Indian\_\_\_\_\_ Hispanic/Latin American/Mexican-American\_\_\_\_\_ White Other 4. Branch/s of Service: (Check all applicable) Army\_\_\_\_ Navy\_\_\_\_ Marines\_\_\_\_\_ Air Force Coast Guard Reserves National Guard 5. Years in Service 

#### **Appendix C: ASI-III**

1. It is important for me not to appear nervous.

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

# Appendix D: BDI-II

1. Sadness:

- 0- I do not feel sad
- 1- I feel sad much of the time.
- 2- I am sad all the time.
- 3- I am so sad or unhappy that I can't stand it.
- 2. Pessimism:
  - 0-I am not discouraged about my future.
  - 1- I feel more discouraged about my future than I used to be.
  - 2- I do not expect things to work out for me.
  - 3- I feel my future is hopeless and will only get worse.
- 3. Past Failure:
  - 0- I do not feel like a failure
  - 1- I have failed more than I should have.
  - 2- As I look back, I see a lot of failures.
  - 3- I feel like I am a total failure as a person..
- 4. Loss of pleasure:
  - 0- I get as much pleasure as I ever did from the things I enjoy.
  - 1- I don't enjoy things as much as I used to.
  - 2- I get very little pleasure from the things I used to enjoy.
  - 3- I can't get any pleasure from the things I used to enjoy.
- 5. Guilty feelings:
  - 0- I don't feel particularly guilty.
  - 1- I feel guilty over many things I have done or should have done
  - 2- I feel quite guilty most of the time.
  - 3- I feel guilty all the time.
- 6. Punishment Feelings:
  - 0- I don't feel I am being punished.
  - 1- I feel I may be punished.
  - 2- I expect to be punished
  - 3- I feel I am being punished.
- 7. Self-Dislike:
  - 0- I feel the same about myself as ever.
  - 1- I have lost confidence in myself.
  - 2- I am disappointed in myself.
  - 3- I dislike myself.
- 8. Self-Criticalness:
  - 0- I don't criticize or blame myself more than usual.
  - 1- I am more critical of myself than I used to be.
  - 2- I criticize myself for all my faults.
  - 3- I blame myself for everything bad that happens.
- 9. Suicidal Thoughts or Wishes:
  - 0- I don't have any thoughts of killing myself.
  - 1- I have thoughts of killing myself, but I would not carry them out.

- 2- I would like to kill myself.
- 3- I would kill myself if I had the chance.
- 10. Crying
  - 0- I don't cry any more than I used to.
  - 1- I cry more than I used to.
  - 2- I cry over every little thing.
  - 3- I feel like crying, but I can't.
- 11. Agitation:
  - 0- I am no more restless or wound up than usual.
  - 1- I feel more restless or wound up than usual.
  - 2- I am so restless or agitated that it's hard to stay still.
  - 3- I am so restless or agitated that I have to keep moving or doing something.
- 12. Loss of Interest:
  - 0- I have no lost interest in other people or activities.
  - 1- I am less interested in other people or things than before.
  - 2- I have lost most of my interest in other people or things.
  - 3- It's hard to get interested in anything.
- 13. Indecisiveness:
  - 0- I make decisions about as well as ever.
  - 1- I find it more difficult to make decisions than usual.
  - 2- I have great difficulty in making decisions than I used to.
  - 3- I have trouble making any decisions.
- 14. Worthlessness:
  - 0- I do not feel I am worthless.
  - 1- I don't consider myself as worthwhile and useful as I used to.
  - 2- I feel more worthless as compared to other people.
  - 3- I feel utterly worthless.
- 15. Loss of energy:
  - 0- I have as much energy as ever.
  - 1- I have less energy than I used to.
  - 2- I don't have energy to do very much.
  - 3- I don't have energy to do anything.
- 16. Changes in sleep pattern:
  - 0- I have not experienced any change in my sleeping pattern.
  - 1a- I sleep somewhat more than usual; 1b- I sleep somewhat less than usual.
  - 2a- I sleep a lot more than usual; 2b- I sleep a lot less than usual.
- 3a- I sleep most of the day; 3b- I wake up 1-2 hours early and can't get back to sleep. 17. Irritability:
  - 0- I am no more irritable than usual.
  - 1- I am more irritable than usual.
  - 2- I am much more irritable than usual.
  - 3- I am irritable all the time.
- 18. Changes in Appetite:
  - 0- I have not experienced changes in appetite.

1a- My appetite is somewhat less than usual; 1b- My appetite is somewhat greater than usual.

2a- My appetite is much less than before; 2b- My appetite is much greater than before.

3a- I have no appetite at all; 3b- I crave food all the time.

- 19. Concentration Difficulty:
  - 0- I can concentrate as well as ever.
  - 1- I can't concentrate well at all.
  - 2- It's hard to keep my mind on anything for very long.
  - 3- I find I can't concentrate on anything.
- 20. Tiredness or Fatigue
  - 0- I am no more tired or fatigued than usual.
  - 1- I get more tired or fatigued more easily than usual.
  - 2- I am too tired or fatigued to do a lot of the things I used to do.
  - 3- I am too tired or fatigued to do most of the things I used to do.
- 21. Loss of Interest in Sex:
  - 0- I have not noticed any recent change in my interest in sex.
  - 1- I am less interested in sex than I used to be.
  - 2- I am much less interested in sex now.
  - 3- I have lost interest in sex completely.

## **Appendix E: PCL-C**

- 1. Repeated, disturbing *memories*, *thoughts*, or *images* of a stressful experience from the past?
- 2. Repeated, disturbing dreams of a stressful experience from the past?
- 3. Suddenly acting or feeling as if a stressful experience *were happening again* (as if you were reliving it)?
- 4. Feeling very upset when something reminded you of a stressful experience from the past?
- 5. Having *physical reactions* (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of a stressful experience from the past?
- 6. Avoid *thinking about* or *talking about* a stressful experience or avoid having feelings related to it?
- 7. Avoid *activities* or *situations* because they remind you of a stressful experience from the past?
- 8. Trouble remembering important parts of a stressful experience from the past?
- 9. Loss of interest in things that you used to enjoy?
- 10. Feeling distant or cut off from other people?
- 11. Feeling emotionally numb or being unable to have loving feelings for those close to you?
- 12. Feeling as if your *future* will somehow be *cut short*?
- 13. Trouble *falling* or *staying* asleep?
- 14. Feeling *irritable* or having angry outbursts?
- 15. Having difficulty concentrating?
- 16. Being "super alert" or watchful on guard?
- 17. Feeling jumpy or easily startled?

## Appendix F: West Haven-Yale Multidimensional Pain Inventory

## BEFORE YOU BEGIN, PLEASE ANSWER 2 PRE-EVALUATION QUESTIONS BELOW:

1. Some of the questions in this questionnaire refer to your "significant other". A significant other is *a person with whom you feel closest*. This includes anyone that you relate to on a regular or infrequent basis. It is very important that you identify someone as your "significant other". Please indicate below who your significant other is (check one):

آ Spouse	<sup>Î</sup> Partner/Companion	اً Housemate/Roomate
آ Friend	اً Neighbor	<sup>1</sup> Parent/Child/Other relative
<sup>1</sup> Other (please	describe):	

2. Do you currently live with this person? 1 YES 1 NO

When you answer questions in the following pages about "your significant other", always respond in reference to the specific person you just indicated above.

A.

In the following 20 questions, you will be asked to describe your pain and how it affects your life. Under each question is a scale to record your answer. Read each question carefully and then <u>circle</u> a number on the scale under that question to indicate how that specific question applies to you.

1.Rate the level of your pain at the present moment.

0 1 2 3 4 5 6 No pain Very intense pain

2.In general, how much does your pain problem interfere with your day to day activities?

0123456No intereferenceExtreme interference

3. Since the time you developed a pain problem, how much has your pain changed your ability to work?

0 1 2 3 4 5 6 No change Extreme change Check here, if you have retired for reasons other than your pain problem

4. How much has your pain changed the amount of satisfaction or enjoyment you get from participating in social and recreational activities?

	No cha	0 inge	1	2	3	4	5	6 Extreme change
5.	How suppo	ortive or	helpful i	s your sj	pouse (si	ignificar	t other)	to you in relation to your pain?
	Not at	0 all suppo	1 ortive	2	3	4	5	6 Extremely supportive
6.	Rate your o	overall m	ood dur	ing the <u>p</u>	ast weel	<u>K</u> .		
	Extrem	0 nely low	1 mood	2	3	4	5	6 Extremely high mood
7.	On the ave	rage, hov	v severe	has you	r pain be	een durii	ng the <u>la</u>	st week?
	Not at	0 all sever	1 e	2	3	4	5	6 Extremely severe
8.	How much	has you	r pain ch	nanged y	our abili	ty to pai	ticipate	in recreational and other social activities?
9.	No cha How much	0 inge has you	1 r pain ch	2 nanged th	3 ne amour	4 nt of sati	5 sfaction	6 Extreme change you get from family-related activities?
	No cha	0 inge	1	2	3	4	5	6 Extreme change
10.	How worri	ed is you	ir spouse	e (signifi	cant oth	er) abou	t you in	relation to your pain problem?
	Not at	0 all worri	1 ed	2	3	4	5	6 Extremely worried
11.	During the	past wee	ek, how	much co	ntrol do	you feel	that you	u have had over your life?
	Not at	0 all in cor	1 ntrol	2	3	4	5	6 Extremely in control
12.	How much	sufferin	g do you	ı experie	nce beca	ause of y	our pair	n?
	No suf	0 fering	1	2	3	4	5	6 Extreme suffering
13.	How much	has you	r pain ch	nanged y	our mari	riage and	d other fa	amily relationships?
	No cha	0 inge	1	2	3	4	5	6 Extreme change

14. How much has your pain changed the amount of satisfaction or enjoyment you get from work?

	0 No change	1	2	3	4	5	6 Extreme change
	Check here	e, if yo	u are not	present	ly worki	ng.	
15.	How attentive is y	our sp	ouse (sig	nificant	other) to	o your pa	ain problem?
	0 Not at all atte	1 ntive	2	3	4	5	6 Extremely attentive
16.	During the past w	<u>eek</u> , ho	w much	do you	feel that	you've l	been able to deal with your problems?
	0 Not at all	1	2	3	4	5	6 Extremely well
17.	How much has yo	our pair	changed	l your al	bility to	do house	ehold chores?
	0 No change	1	2	3	4	5	6 Extreme change
18.	During the past w	<u>eek</u> , ho	w irritab	le have	you beer	n?	
	0 Not at all irrit	1 able	2	3	4	5	6 Extremely irritable
19.	How much has yo	our pair	changed	l your fr	riendship	os with p	eople other than your family?
	0 No change	1	2	3	4	5	6 Extreme change
20.	During the past w	<u>eek</u> , ho	w tense	or anxio	us have	you beer	n?
	0 Not at all tens	1 se or an	2 xious	3	4	5	6 Extremely tense or anxious
B.							
In th	nis section, we are	interes	ted in kn	owing h	now you	r signific	cant other (this refers to the person you

indicated above) responds to you when he or she knows that you are in pain. On the scale listed below each question, **circle a number** to indicate <u>how often</u> your significant other generally responds to you in that particular way <u>when you are in pain</u>.

1. Ignores me.

0 1 2 3 4 5 6 Never Very often 2. Asks me what he/she can do to help.

	Never	0	1	2	3	4	5	6 Very often
3.	Reads to n	ne.						
	Never	0	1	2	3	4	5	6 Very often
4.	Expresses i	rritatio	on at me	<b>.</b>				
	Never	0	1	2	3	4	5	6 Very often
5.	Takes over	my jo	bs or du	ities.				
	Never	0	1	2	3	4	5	6 Very often

6. Talks to me about something else to take my mind off the pain.

	Never	0	1	2	3	4	5	6 Very often					
7.	Expresses f	rustratio	n at me.										
	Never	0	1	2	3	4	5	6 Very often					
8.	Tries to get me to rest.												
	Never	0	1	2	3	4	5	6 Very often					
9.	Tries to inv	olve me	in some	activity									
	Never	0	1	2	3	4	5	6 Very often					
10.	Expresses a	nger at r	ne.										
	Never	0	1	2	3	4	5	6 Very often					

11. Gets me some pain medications.

Never	0	1	2	3	4	5	6 Very often						
12. Encourages me to work on a hobby.													
Never	0	1	2	3	4	5	6 Very often						
13. Gets me so	13. Gets me something to eat or drink.												
Never	0	1	2	3	4	5	6 Very often						
14. Turns on the T.V. to take my mind off my pain													
Never	0	1	2	3	4	5	6 Very often						

## C.

2.

3.

Listed below are 18 common daily activities. Please indicate <u>how often</u> you do each of these activities by <u>circling</u> a number on the scale listed below each activity. Please complete <u>all</u> 18 questions.

1. Wash dishes.

Never	0	1	2	3	4	5	6 Very often
Mow the la	wn.						
Never	0	1	2	3	4	5	6 Very often
Go out to e	at.						
Never	0	1	2	3	4	5	6 Very often

4. Play cards or other games.

	Never	0	1	2	3	4	5	6 Very often						
5.	. Go grocery shopping.													
	Never	0	1	2	3	4	5	6 Very often						
6.	Work in the garden.													
	Never	0	1	2	3	4	5	6 Very often						
7.	. Go to a movie.													
	Never	0	1	2	3	4	5	6 Very often						
8.	Visit friend	ls.												
	Never	0	1	2	3	4	5	6 Very often						
9.	Help with t	he house	cleanin	g.										
	Never	0	1	2	3	4	5	6 Very often						
10.	Work on th	e car.												
	Never	0	1	2	3	4	5	6 Very often						
11.	11. Take a ride in a car.													
	Never	0	1	2	3	4	5	6 Very often						
12.	Visit relativ	ves.												
	Never	0	1	2	3	4	5	6 Very often						
13.	Prepare a m	neal.												

Never	0	1	2	3	4	5	6 Very often						
14. Wash the car.													
Never	0	1	2	3	4	5	6 Very often						
15. Take a trip.													
Never	0	1	2	3	4	5	6 Very often						
16. Go to a park or beach.													
Never	0	1	2	3	4	5	6 Very often						
17. Do a load of laundry.													
Never	0	1	2	3	4	5	6 Very often						
18. Work on a needed house repair.													
Never	0	1	2	3	4	5	6 Very often						