

PTSD AND HEALTH AMONG VA GENERAL MEDICAL CARE PATIENTS:
AN INVESTIGATION INTO THE MEDIATING EFFECTS OF COPING

By

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Abstract

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This study investigated the relationship between PTSD, physical health, and coping among 134 VA general medical and women's health clinic patients. Coping behaviors were investigated as potential mediators of the relationship between PTSD symptom severity and health. The research literature has consistently revealed a robust relationship between PTSD and self-reported physical health perceptions and symptoms. However, there have been fewer studies investigating the relationship between PTSD and physician-diagnosed medical conditions and the mechanisms relating PTSD to health are still unknown. In this study, results revealed that PTSD symptom severity predicted self-reported health, which replicates previous findings. Additionally, PTSD severity predicted physician-diagnosed medical conditions, which extends previous findings relating PTSD and adverse health. Finally, coping behaviors partially mediated that relationship between PTSD and self-reported health. If replicated, this finding may impact the treatment of PTSD; it may be beneficial for clinicians to facilitate adaptive coping behaviors before adverse health consequences arise.

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CHAPTER ONE

INTRODUCTION

Overview of PTSD

The impact of extreme stress on human beings has been chronicled for centuries. Early accounts of adverse reactions to trauma came from reports of natural disasters, as well as war-related traumas (Saigh and Bremner, 1999). However, before 1980 there were no attempts to categorize or define the symptoms experienced by those exposed to traumatic stress and until then, PTSD was not a diagnosable mental disorder. Since its inclusion in the *Diagnostic and Statistical Manual of Mental Disorder-III* (DSM-III; American Psychiatric Association [APA], 1980), PTSD has been the subject of a tremendous amount of empirical study. Most of the initial research investigating PTSD was supported by the Department of Veterans Affairs and examined the adjustment of veterans of Vietnam and other wars. With the acceptance of PTSD as a mental disorder of its own right, studies exploring the psychological and physiological adjustment to traumatic stress flourished. Researchers have now begun to investigate how reactions to traumatic stress fits into etiological models of stress and illness. The health outcomes of individuals with PTSD have only recently gained attention; even fewer studies have been conducted to investigate the mechanisms operating within the PTSD and health relationship.

Characteristics of PTSD

Posttraumatic Stress Disorder is characterized by three clusters of symptoms that emerge following exposure to a traumatic life event (Criterion A): re-experiencing (Criterion B), avoidance (Criterion C), and hyperarousal (Criterion D) symptoms. The Criterion A event must involve direct personal experience of an event that involves actual or threatened death, injury, or threat to an individual's physical integrity; or witnessing an event of this sort; or hearing about

threat to or actual death or injury experienced by a family member or close friend (APA, 2000). The individual's emotional response to the traumatic stressor must include intense fear, horror, or helplessness. Criterion A events can include, but are not limited to, natural disasters, transportation accidents, manmade disasters, physical assault, sexual assault, combat, life-threatening illness, and sudden, violent death of a friend or loved one. Re-experiencing symptoms include recurrent and intrusive recollections and/or dreams of the traumatic stressor, acting or feeling as if the event were occurring again, and intense psychological and/or physiological reactivity upon exposure to cues that remind the individual of the event (APA, 2000). Avoidance symptoms are characterized by the persistent avoidance of cues associated with the event, inability to recall important aspects of the trauma, markedly diminished interest in daily activities, feelings or detachment from others, or sense of a foreshortened future (APA, 2000). Hyperarousal symptoms include difficulty sleeping, irritability, hypervigilance, and/or increased startle response. Individuals must endorse at least one B Criterion symptom, three Criterion C symptoms and two Criterion D symptoms to meet criteria for PTSD. Symptoms must be present for at least 1 month and cause clinically significant distress or impairment.

Prevalence Rates of PTSD

Epidemiological research indicates that exposure to potentially traumatic life events and PTSD is fairly common. In community samples, it is estimated that between 39% (Breslau & Davis, 1992) and 89.6% (Breslau et al., 1998) of people are exposed to a traumatic event in their lifetime. Prevalence rates for PTSD have also been investigated in community samples and specific trauma populations; however, most research on prevalence rates of PTSD has been estimated from veteran samples. It has been estimated that the lifetime prevalence rate of PTSD for male and female Vietnam veterans is 31% and 27% respectively and current prevalence rates

among male and female Vietnam theater veterans is 15% and 8.5% respectively (Kulka et al., 1990). Lifetime prevalence rates in the general population have been estimated between 1% and 9% (Hidalgo, Jonathan, & Davidson, 2000). Data from the Epidemiological Catchment Area study revealed lifetime prevalence estimates around 1% (ECA; Helzer et al., 1987; Davidson, Hughes, Blazer, George, 1991). Data from the National Comorbidity Survey estimated lifetime prevalence of PTSD at 7.8% and current PTSD prevalence of 2.3% (NCS; Kessler et al., 1995). Although the NCS lifetime prevalence estimates were considerably higher than the ECA estimates, the results of the NCS are more convincing than those of the ECA due to the ECA's reliance on a single diagnostic instrument, the Diagnostic Interview Schedule (DIS), and the non-representative sample.

Little published data exist on the prevalence rates of PTSD in primary care settings. Detection of PTSD in primary care is vital; in the age of health maintenance organizations primary care is most often the first point of contact for people experiencing mental and physical health problems. Recently, two studies have been published that examined prevalence rates in US primary care settings; the results of these studies estimated prevalence rates ranging from 11.8% (Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000) to 38.6% (Samson, Bensen, Beck, Price, & Nimmer, 1999). In Israeli primary care settings, prevalence rates for PTSD in men were 7.5% and were 10.5% in women (Taubman-Ben-Ari, Rabinowitz, & Vaturi, 2001). Exposure to traumatic life events and PTSD are highly prevalent in our society and incur substantial psychological and physical health consequences.

Comorbid Conditions

PTSD has been associated with increased rates of depression, substance use disorders, and anxiety disorders, including, generalized anxiety disorder and panic disorder (APA, 2000).

The NCS study found that a lifetime history of at least one other DSM disorder was present in 79% and 88% of the women and men with lifetime PTSD respectively (Kessler et al., 1995). In the NCS study, individuals with lifetime PTSD were more likely to be diagnosed with affective disorders, anxiety disorders, and substance use disorders than individuals without a history of PTSD. In an epidemiological study of PTSD, results indicated that individuals with PTSD were 10 times more likely to have a diagnosis of social phobia, generalized anxiety, major depression, and obsessive-compulsive disorder than persons without PTSD (Davidson, Hughes, Blazer, George, 1991). In a sample of young urban adults, Breslau and Davis (1992) found that 81% had both PTSD and another anxiety or affective disorder. In Vietnam theater veterans with PTSD, 98.8% had a history of another DSM disorder (Kulka et al., 1990). Studies with community, clinical, and veteran samples find that PTSD is highly comorbid with most other anxiety and affective disorders.

PTSD and Health

There is a growing literature base on the relationship between PTSD and physical health outcomes. The literature consists of studies that have investigated PTSD in combat veterans, community samples, and specific exposure populations. The literature is compromised by the fact that the relationship between PTSD and health has most often been studied using self-report measures of health including, perceptions of health status, physical symptoms, and physical conditions as outcome measures. There are fewer published studies that investigated PTSD and health using morbidity as an outcome measure. Although, PTSD is robustly associated with impairments in self-reported health status, the evidence regarding morbidity is much less robust and mixed.

Perceptions of Health Status

Studies that examine the relationship between PTSD and health often measure overall perception of health status. Different operational definitions for health perception have been used in different studies but, generally, research assesses self-reported health status with 5-point Likert rating questions. The following represents a review of PTSD and health perceptions research.

The National Vietnam Veterans Readjustment Study (NVVRS) was one of the earliest published studies to include perceived health status to measure the relationship between PTSD and health (Kulka et al., 1990). Respondents were asked to rate, on a 5-point scale, their health in general and rate their health compared to other people their age. When compared to other Vietnam veterans without PTSD, both men and women with a current diagnosis of PTSD rated their physical health more negatively. Zatzick et al. (1997a) strengthened the results of the NVVRS study by reanalyzing the data and controlling for demographics, comorbid psychiatric disorders, and other medical disorders. The reanalysis revealed that a nationally representative sample of male Vietnam veterans with PTSD reported poorer physical health as compared to participants without PTSD. Zatzick et al. (1997b) also reanalyzed the NVVRS data to investigate the relationship between PTSD and self-reported health status in a nationally representative sample of female Vietnam veterans. In this sample, women with PTSD were 3.4 times more likely to report fair or poor overall physical health than women without PTSD even after adjusting for chronic medical conditions and comorbid psychiatric disorders. Following the studies that focused on American Vietnam veteran's experience with PTSD, MacDonald, Chamberlain, and Long (1995) reviewed the literature on PTSD in New Zealand Vietnam veterans. MacDonald and Colleagues conducted several studies on the relationship between

PTSD and perceived health status and concluded that veterans with PTSD reported significantly lower self-reported health status than veterans without PTSD.

Kimerling, Clum, and Wolfe (2000) studied the relationship between trauma, PTSD, and self-reported health in 52 women who served in the Vietnam era. Subjective health status was operationalized using global health perceptions and physical symptoms. Health perceptions were measured using a 5-point Likert scale question with women rating their overall physical health in the past year. The results identified a mediational model between trauma exposure, PTSD symptoms, and self-reported health status. Specifically, PTSD symptoms mediated the relationship between trauma exposure and self-reported health perceptions. Additionally, hyperarousal symptoms were significantly associated with poorer health perceptions. Overall, these results demonstrate the association between PTSD and global health perception in a sample of women.

Lastly, Zoellner, Goodwin, and Foa (2000) investigated PTSD severity and health perceptions in female assault victims. Contrary to the results of the studies presented previously, this study was unable to identify any significant relationships between overall health perceptions and demographics, prior trauma history, or the impact of stressful life events. However, there was a weak association between psychological disturbance and perceived health.

Physical Health Symptoms

In addition to studying the relationship between PTSD and self-reported health perceptions, the majority of studies have investigated the relationship between PTSD and self-reported physical health symptoms (e.g., headaches, nausea, diarrhea, difficulty breathing). Shalev, Bleich, and Ursano (1990) examined self-reported physical health symptoms of 50 Israeli combat veterans with a PTSD diagnosis and 48 age-matched combat veterans without

PTSD. In this study, the participants with PTSD reported significantly more physical health symptoms than the non-PTSD group. PTSD participants reported more cardiovascular, neurological, gastrointestinal, and audiological problems and more headaches and back pains. In a preliminary report, Litz, Keane, Fisher, Marx, and Monaco (1992) investigated PTSD and physical health complaints in 37 male Vietnam veterans and found that veterans with PTSD reported significantly more ringing in the ears, rapid breathing, shortness of breath, rapid heart rate, diarrhea, nausea, and stomach butterflies. Beckham et al. (1998) also studied the relationship between PTSD and health symptom complaints in Vietnam combat veterans and found that veterans with PTSD reported more health symptoms than veterans without PTSD. In a series of studies on PTSD and health consequences for New Zealand Vietnam veterans, MacDonald and colleagues (1995) found that veterans with PTSD reported more physical health symptoms and greater severity of symptoms than their non-PTSD counterparts. In a sample of older male veterans, those with PTSD reported significantly more chest pain and arthritis when compared to those without PTSD (Hankin, Abueg, Gallagher-Thompson, & Laws, 1996).

Kimerling, Clum, and Wolfe (2000) found that women veterans with PTSD reported significantly more stomach cramps/gas, muscle weakness, and neckaches than women without PTSD. PTSD was also significantly correlated with physical symptoms. In regression analyses, PTSD symptoms significantly predicted physical symptoms.

Wagner, Wolfe, Rotnitsky, Proctor, and Erickson (2000) examined the relationship between PTSD symptoms and self-reported health problems. Participants were Gulf War veterans (N=2301) that were assessed for PTSD immediately upon returning. Participants also completed two health measures, the Brief Symptom Inventory and the Health Symptom Checklist at three time points: upon return, 1 year later, and 2 years later. Hierarchical

regression analysis revealed that PTSD symptomology upon returning from the Gulf War predicted adverse health symptoms at the 2-year follow-up. In another study investigating physical health symptoms in Persian Gulf veterans, Baker, Mendenhall, Simbartl, Magan, & Steinberg (1997) also found that veterans with PTSD reported more physical health conditions than control veteran participants. Those with PTSD were more likely to report fatigue, nausea, muscle aches, dizziness, back pain, stomachache, and numbness than those without PTSD.

McFarlane, Atchinson, Rafalowicz, & Papay (1994) explored the relationship between PTSD and physical health symptoms after a bushfire among non-treatment seeking firefighters. The firefighters diagnosed with PTSD and those without PTSD did not differ in the amount of exposure to the fire or in the amount or severity of injury; however, the PTSD group reported significantly more physical health symptoms. Specifically, they reported more cardiovascular, respiratory, musculoskeletal, and neurological symptoms.

Medical Conditions

Self-Reported.

Few studies have been published on the relationship between PTSD and physical health conditions. Kulka et al. (1990) investigated the self-report physical health conditions of veterans with PTSD in the NVVRS study. Participants were asked about a broad array of physical conditions, including cardiovascular (e.g., high blood pressure), respiratory (e.g., asthma), gastrointestinal (e.g., ulcers), and musculoskeletal (e.g., permanent problem with leg or back). When compared to veterans without PTSD, veterans with PTSD reported significantly more chronic health conditions. Zatzick et al. (1997a, 1997b) reanalyzed the NVVRS study data and found that PTSD was related to the number of chronic health problems after controlling for other psychiatric and medical disorders in males but not in females. Beckham et al. (1998) also

studied the relationship between PTSD and physical health conditions in Vietnam combat veterans and found that veterans with PTSD reported more lifetime and current medical conditions than veterans without PTSD.

Boscarino (1997) examined the health consequences of PTSD in male Vietnam veterans by reviewing their medical histories approximately 20 years after combat exposure. When compared to non-PTSD controls, veterans who developed PTSD reported significantly higher prevalence of circulatory, digestive, musculoskeletal, nervous system, respiratory, and non-sexual infectious diseases. In a study of female veterans, Wolfe, Proctor, Davis, Borgos, and Friedman (1994) found that veterans with PTSD had more dermatologic, gastrointestinal, ophthalmologic, endocrinologic, gynecologic, and cardiovascular problems than veterans without PTSD. Litz et al. (1992) investigated the self-report of physician diagnosed health conditions and failed to find differences between treatment seeking veterans with PTSD and those without PTSD in amount of self-reported physician diagnosed disorders.

Breslau and Davis (1992) investigated the relationship between PTSD and physical health conditions among non-veterans; they found that young adults with PTSD for more than one year reported more health conditions than young adults with PTSD for less than one year.

Most recently, Ford et al. (2001) investigated whether PTSD symptoms mediated the relationship between toxic gas exposure and long-term health outcomes. In this study, PTSD symptoms were found to be important in developing adverse health in participants that had been exposed to a toxic substance approximately 50 years prior. The actual physical effects from the exposure itself were only weakly associated with adverse health. Additionally, the effect of health risk behaviors (i.e., smoking and alcohol problems) on adverse health outcomes was nonexistent. Path analysis conducted in this study demonstrated that PTSD symptoms had a

direct impact on self-reported illnesses and explained a significant amount of variance (23%).

The results of this study strengthen the evidence for the relationship between PTSD and adverse health outcomes by separating the effects of actual physical injury of the trauma exposure itself and reaffirming that the PTSD symptomology accounted for the health consequences.

Physician Diagnosed Health Conditions.

The research literature on PTSD and physician diagnosed health conditions, a more rigorous measure of physical health, is relatively sparse. Recently, Schnurr, Spiro, and Pairs (2000) investigated PTSD in relation to physician diagnosed health conditions. Even after controlling for health risk behaviors, body mass index, and age, the survival analysis found that PTSD was associated with increased arterial, lower gastrointestinal, dermatological, and musculoskeletal medical disorders. Beckham et al. (1998) also studied the relationship between PTSD and morbidity in Vietnam combat veterans. Participants completed questionnaires that assessed health status and chart reviews were conducted for evidence of medical disorders. Multivariate analyses of covariance (controlling for age, SES, minority status, combat exposure, alcohol use, and tobacco use) revealed that veterans with PTSD had more physician diagnosed medical conditions than veterans without PTSD. White and Faustman (1989) retrospectively reviewed the discharge summaries of 543 PTSD inpatients for co-existing Axis III diagnoses. Out of 326 veterans who were identified to have a least one medical condition, 40% of these patients had an additional, co-occurring, physician-diagnosed health conditions, specifically, musculoskeletal conditions.

The results of the above-described studies are in contrast to Shalev et al. (1990) who included a physical examination and laboratory tests in their examination of PTSD and health. Although participants with PTSD reported more symptoms, they did not differ from controls on

the biological indices of health. However, participants with PTSD did not perform as well as those without PTSD on an effort tolerance test. In summary, this review of the literature indicates that a strong relationship exists between PTSD, perceived health status, self-reported health symptoms and conditions.

Health Care Utilization

Physical Health Services.

The robust evidence of the relationship between PTSD and adverse health naturally leads to implications in health care utilization and highlights the importance of detection in primary care. It is possible that persons exposed to trauma that subsequently develop PTSD, relative to those who do not, sustain an adverse impact on their physical health and/or health perceptions that consequently increase their usage of the health care system.

Kulka et al. (1990) examined the medical utilization of veterans from the NVVRS study and found that since leaving the military both men and women with PTSD report significantly more use of VA inpatient services for physical health than veterans without PTSD. Significant differences were also found for use of outpatient services for physical health since leaving the military between veterans with and without PTSD. Current usage of VA physical health services again differed for males with PTSD compared to males without PTSD; however, current amount of physical health services used by females with PTSD was not statistically different than females without PTSD.

Deykin et al. (2001) investigated the association between PTSD and use of physical health services. Participants were 156 male veterans under the age of 66 who had received primary health care at the VA Boston Healthcare System. Utilization was determined by counting the number of visits recorded in the patient's electronic medical record; only care

provided by the departments of medicine, neurology, and surgery were included. Participants were categorized into “high users” (n=102) with number of visits between 28 and 104 and “low users” (n=54) with a number of visits between 1 and 4. Not surprisingly, “high users” were twice as likely to have met diagnostic criteria for PTSD than “low users”. Additionally, when compared to participants with partial PTSD or no PTSD, participants with current PTSD averaged 30% more health care visits. Path analysis also revealed that medical conditions mediated the relationship between PTSD and utilization; additional analysis revealed that this relationship was largely accounted for the “high users”. Additionally, in a series of studies on PTSD among New Zealand Vietnam veterans, utilization among veterans with PTSD was higher than in non-PTSD counterparts (MacDonald et al., 1995).

Schnurr, Friedman, Sengupta, Jankowski, & Holmes (2000) reanalyzed the data from the NVVRS study and the Hawaiian Vietnam Veterans Project (HVVP) to examine medical care utilization. The final sample included 1773 male Vietnam veterans. In this study, PTSD was found to predict utilization above that which was accounted for by age, other Axis I disorders, and lifetime substance abuse.

Marshall, Jorm, Grayson, & O’Toole (2000) studied the sequela of PTSD on medical-care costs for 641 Australian Vietnam veterans. Overall, a PTSD diagnosis was associated with higher medical costs. However, the study results indicated that once age and physical health diagnoses were controlled, PTSD was not significantly associated with health care costs. Additionally, when other mental health problems were controlled PTSD was no longer a predictor of costs associated with health care. In the analysis described earlier, PTSD status was determined using a clinical diagnosis but when sub-clinical or partial-PTSD was examined the relationship between utilization costs and PTSD symptomology returned and remained after

controlling for age and physical health. By focusing on only diagnosable cases, research may underestimate the usage and cost associated with sub-syndromal levels of PTSD and the concurrent health problems.

Bramsen & van der Ploeg (1999) explored the physical health care utilization among World War II survivors from the Netherlands. Participants were a random community sample of persons with birth years between 1920 and 1929; these years include persons that would have been adolescents or young adults in WWII and a large sample of military veterans. Results indicated that PTSD intrusion symptoms were significantly correlated with health care utilization in the years of 1990-1992, fifty years after WWII.

McFarlane et al. (1994) found that non-treatment seeking firefighters exposed to a bushfire with PTSD were more likely to consult a doctor for their physical symptoms and visited the doctor more often than firefighters without PTSD. This medical utilization was not accounted for by the severity of the fire exposure or the physical injuries sustained; PTSD and Non-PTSD groups had similar levels of exposure and injury.

Stein et al. (2000) examined the utilization rates for 368 participants recruited from a community based primary care clinic. Stein and colleagues found that participants with PTSD were more likely to have been hospitalized and were more likely to have gone to the emergency room in the 6 months prior to the study. Participants with PTSD were also more likely to be high users overall (> 6 visits in 6 months) than those without PTSD.

There is strong support in the research literature for the relationship between PTSD and increased physical health care utilization; however, there are few of studies that have not supported these findings. One pilot study of 30 male veterans over the age of 60 found no differences in health care utilization between PTSD and non-PTSD groups (Hankin, Abueg,

Gallagher-Thompson, & Laws, 1996). Recently, Rosenberg et al. (2000) investigated health care utilization in three high-risk help-seeking groups. Participants were 107 male and female gynecological outpatients, psychiatric inpatients, and seizure disorder inpatients. Medical utilization was obtained from computerized medical center database, trauma was assessed using the Trauma History Questionnaire (THQ), and PTSD was assessed using the PTSD Checklist (PCL). The prevalence rate for trauma in the study population was 89% and there were no differences between gynecological, psychiatric, or seizure disorder patients in medical utilization rates. Forty-two percent of the sample met criteria for PTSD. The results supported the hypothesis that the total number of traumas would be significantly correlated with medical utilization but failed to find PTSD as the mediator between trauma and health care utilization.

Mental Health Services.

Past and current research supports the relationship between PTSD diagnosis and increased physical health care utilization; however, research on mental health care utilization and PTSD has yielded inconsistent results. As part of the NVVRS study, Kulka and colleagues (1990) examined mental health service utilization among men and women Vietnam veterans. Men and women veterans with PTSD were significantly more likely to have used mental health services in the past 12 months and were more likely to have ever used these services compared to their counterparts without PTSD. Bramsen et al. (1999) examined mental health service utilization of WWII survivors in the Netherlands. They found that 50% of the participants with current PTSD had never consulted a mental health professional for aftereffects of the war since 1940. In contrast, 79% of those with current PTSD received physical health care for aftereffects of the war. The results of this study again highlight the importance of detection and referral in primary care. With proper detection and referral by physicians, trauma survivors will be

directed to the appropriate mental health care thereby possibly eliminating unnecessary physical health care costs.

Amaya-Jackson et al. (1999) examined the utilization of mental health services in a community sample. The sample was a subset of the ECA study from the central North Carolina region. Participants with PTSD and sub-threshold PTSD (n=49) were compared to non-psychiatric controls (n=147) on mental health care utilization. Those participants with PTSD and sub-threshold PTSD used more mental health services than the control group; however, only 20% of the PTSD/Sub-PTSD group received mental health treatment. Stein et al. (2000) studied utilization in a primary care population and found that those with PTSD were more likely to have visited a mental health professional in the 6 months before the study. New and Berliner (2000) analyzed the records of 318 victims of crime and again found that those with a primary diagnosis of PTSD received more mental health treatment than victims with other primary diagnoses like depression or adjustment disorders.

Overall, it appears plausible that persons with PTSD may not be receiving the appropriate mental health care and may be utilizing physical health care services for psychological problems related to PTSD. In this regard, it is possible that PTSD is not adequately recognized, diagnosed, or treated in the health care system. Recently, Taubman-Ben-Ari and colleagues (2001) examined detection of PTSD in primary care settings and found that physicians detected 49% of patients who met criteria for PTSD. With primary care often being the first point of contact in the health care system the results of these studies highlight the important role that primary care doctors have in the proper diagnosis and treatment of PTSD.

Summary

The research literature consistently reveals an association between PTSD and adverse physical health. Although the majority of the support has been based on self-reported health perceptions, symptoms, and conditions, there is emerging evidence that PTSD is associated with medical morbidity. Research has also shown that the link between PTSD and adverse health is not fully accounted for by the injury caused by the traumatic event; in fact, most people who develop PTSD are not injured as a result of the trauma that caused their PTSD (Friedman & Schnurr, 1995; Ford et al., 2001). In a study of combat veterans with PTSD, researchers found that 60% of the sample had a medical problem but only 6% had a problem that was combat related (White & Faustman, 1989). PTSD has also been associated with increased medical service utilization and it appears that those affected by PTSD may not be receiving the proper mental health care. Although this relationship holds across veteran and civilian samples, and remains after controlling for behavioral risk factors such as smoking, substance use, and comorbid psychiatric disorders, the mechanisms relating PTSD to health are still unknown. Nevertheless, etiological models that were developed to explain the relationship between stress and health have been applied to the relationship between PTSD and adverse health outcomes.

Etiological Models

The association between stress and adverse health was first introduced by Hans Selye (1958) with his development of the general adaptation syndrome. Selye believed that prolonged or repeated exposure to stress was responsible for physiological damage that set the stage for disease. He conducted studies on animals that linked stress to a variety of diseases including kidney disease, myocardial infarction, hypertension, and inflammatory diseases. This groundbreaking research provided the foundation for inquiry into the stress and health

relationship in humans. Although monumental, Selye's model was criticized for not acknowledging the implications psychological factors have in the stress and health relationship. More recently, McEwen and Stellar (1993; McEwen, 1995) presented a psychobiological model of the relationship between traumatic stress and disease that is useful in understanding how PTSD can lead to adverse health consequences through both biological and psychological mechanisms. In this model, the way an individual responds or adapts to stress has a physiological cost that has been described as allostatic load. Allostatic load is the wear and tear on the body and brain resulting from chronic overactivity or inactivity of physiological systems that are normally involved in adaptation to environmental challenge (McEwen, 1995). McEwen described three physiological responses that may lead to allostatic load: frequent stress responses, failure of stress response to shut off, and failure to respond to stress exposure. The pathophysiology of PTSD is a good example of how allostatic load can lead to poor health. Physiological abnormalities associated with PTSD include altered hypothalamic-pituitary-adrenal (HPA) activity, enhanced thyroid function, adrenergic dysregulation, disturbed sleep physiology, autonomic hyperarousal, and enhanced cardiovascular reactivity (Friedman & Schnurr, 1995). Over time, these abnormalities may increase the risk for medical illnesses including cardiovascular disorders.

Using the allostatic load model as a basis, Schnurr and Jankowski (1999) postulated that specific correlates of PTSD could directly and indirectly, through behavioral pathways, promote disease. In this model, psychological factors resulting from PTSD, such as anxiety, depression, and hostility are potential pathways that can explain the relationship between PTSD and health. Broadly speaking, these negative emotions have physiological consequences that put people at risk for illness (for discussion see; Kiecolt-Glaser, McGuire, Robles, and Glaser, 2002). These

psychological states may also influence health risk behaviors such as substance abuse and smoking that are known to have adverse health consequences. Additionally, the biological abnormalities associated with PTSD may have a direct effect on morbidity as described in the allostatic load model or indirectly through behavioral health risk behaviors. Friedman and Schnurr (1995) believe that cumulative and interaction effects exist between these biological, behavioral, and psychological factors and this complex relationship explains the relationships between PTSD and poor health.

Considering the high prevalence rates of traumatic event exposure and PTSD and the robust relationship between PTSD and adverse health, one might assume that everyone who experiences traumatic stress will succumb and develop poor health. However, this relationship is not universal. Besides individual differences in biological and psychological vulnerabilities to poor health, differences in psychological resources may also exist. One psychological resource that may mediate the relationship between PTSD and poor health is coping behaviors or strategies employed by an individual in times of stress and trauma. Coping has been recognized as an important resource to examine in the relationship between PTSD and health (Schnurr & Jankowski, 1999; Friedman & Schnurr, 1995; Kiecolt-Glaser et al., 2002).

Coping

The study of people's responses to stressful situations began with Freud's introduction of the unconscious defense mechanisms and transformed, in the 1960's, into the study of conscious processes utilized by people experiencing stressful life situations. These conscious processes were labeled *coping* responses and provoked an avalanche of research investigating individual responses to stress and traumatic life events. Coping refers to the cognitions and behaviors an individual uses to manage or reduce stress and associated emotional distress (Moos & Schaefer,

1993). Early researchers identified and studied a limited number of coping responses even with the knowledge that the number of coping responses may be unlimited. These coping responses fell into three domains: *emotion-focused*, *problem-focused*, and *avoidance-oriented* coping. Generally, emotion-focused coping includes strategies that attempt to regulate affect, fantasy, or self-preoccupation. Problem-focused coping behavior involves strategies that attempt to re-conceptualize, solve, or minimize the effects of the stressful event. Avoidance-oriented coping includes denial, withdrawal, and distraction.

Another important dimension of coping considered by early researchers is whether coping is dispositional or contextual. Dispositional theorists generally conceptualize coping as a relatively stable preference for certain defenses and coping styles for dealing with stressful situations. On the other hand, contextual theorists generally employ an appraisal-based model that views coping as a response to specific stressful events rather than a stable personality characteristic. Contemporary theorists and researchers acknowledge the contribution of both dispositional and contextual factors in understanding the coping process and include both in the coping response research. Regardless of the conceptual framework used to classify and measure coping, the vast majority of research has investigated the effectiveness of particular coping strategies by examining psychological outcomes of stressful events.

There is considerable evidence that coping behaviors are associated with psychological well-being and have been shown to be correlates and predictors of PTSD reactions to traumatic stress. Nezu and Carnevale (1987) assessed the relationship between PTSD and coping in 43 Vietnam veterans; the results of this study indicated that veterans with PTSD reported less problem-focused coping than combat veterans without PTSD, combat veterans with severe adjustment problems, combat veterans who were well-adjusted, and non-combat veterans. In

Israeli combat veterans, the severity of PTSD was positively related to emotion-focused coping and negatively related to problem-focused coping (Solomon, Mikulincer & Avitzur, 1988; Solomon, Avitzur & Mikulincer, 1989). Additionally, greater use of emotion-focused coping strategies predicted PTSD among 104 Israeli soldiers dealing with combat stress reactions (Solomon, Mikulincer & Benbenishty, 1989). Overall, the research suggests that greater use of avoidance and emotion-focused coping and less use of problem-focused coping is related to PTSD. The relationship between coping style, PTSD, and physical health has largely been ignored.

In one study, Solomon, Mikulincer, and Habershaim (1990) conducted a longitudinal investigation into the coping strategies, social resources, and somatic complaints of 255 Israeli combat veterans. Coping was assessed using the Ways of Coping Checklist (Folkman & Lazarus, 1980; as cited in Solomon, Mikulincer, and Habershaim, 1990). Using factor analysis, the authors identified four coping styles: problem-focused, emotion-focused, seeking social support, and distancing. Results revealed that more severe somatization two years after combat exposure was associated with more frequent use of emotion-focused, distancing coping, and less frequent use of problem-focused coping. None of the coping styles was found to predict subsequent health symptoms. However, PTSD severity and social resources were found to predict health symptoms at the two-year follow-up.

In another study, Zeidner and Ben-Zur (1994) investigated coping among 822 Israeli adults exposed to Persian Gulf War missile attacks. Selected items from the COPE scale (Carver, Scheier, & Weintraub, 1989; as cited in Zeidner and Ben-Zur, 1994) were used to measure coping responses. They found that emotion-focused coping was related to PTSD and also predicted PTSD. In addition, contrary to the previously described study, emotion-focused

coping also predicted physical health symptoms such as headaches, stomach aches, vomiting, and back or neck aches. The divergent results between these two studies may be due to differences in their samples and sampling procedures. Solomon, Mikulincer, and Habershaim conducted a random sample of male military veterans whereas Zeidner and Ben-Zur used a cross-sectional sample of civilian men and women. Interestingly, the women in Zeidner and Ben-Zur's study scored higher than males on all outcome variables (i.e., post-traumatic stress, state anxiety, health symptoms) in the study and reported using more emotion-focused and problem-focused coping than the men. Thus, the inclusion of women in the Zeidner and Ben-Zur study may help explain the differences in results. Research conducted by Breslau and colleagues (1998) suggests that women are at greater risk for PTSD than men after a trauma is experienced. Women with PTSD also have a more severe symptomology and chronic course than men with PTSD (Breslau et al., 1998). Furthermore, women report more health problems and are diagnosed with health problems more often than men (Verbrugge, 1989).

Ouimette, Finney, and Moos (1999) expanded the research on PTSD, coping, and health by examining the mediating effects of coping on substance use among substance abusing patients with and without PTSD. Cognitive avoidance and emotion-focused coping partially mediated the relationship between PTSD and level of substance use for substance abusing patients with PTSD. This study provides preliminary evidence that coping behaviors may explain the relationship between PTSD and health.

Overall, there is research evidence suggesting that reliance on avoidance and emotion-focused coping and the absence of problem-focused coping is related to PTSD. Additionally, current research tentatively suggests that within the PTSD and health relationship, coping responses predict poorer physical health and also partially mediate the relationship. It appears

that coping may be an important variable in the PTSD and health relationship and given the paucity of research into the mediating effects of coping, further investigation is warranted. Generally speaking, ineffective coping behaviors, such as avoidant and emotion-focused coping, may explain the robust relationship between PTSD and physical health through direct and indirect pathways. Following the allostatic load model, ineffective coping techniques may maintain physiological abnormalities associated with PTSD symptoms and overtime this dysregulation may directly increase the risk for physical illness (Friedman & Schnurr, 1995). Alternatively, avoidant coping strategies may increase health risk behaviors (i.e., substance use and smoking) that are known to have adverse health consequences, thereby indirectly increasing the risk for illness. If coping strategies mediate the relationship between PTSD and adverse health then researchers can disseminate this information to clinicians and adaptive coping strategies can be taught to patients before health consequences arise.

The Present Study

The objective of this study was to investigate the relationship between PTSD, physical health, and coping among VA general medical and women's health clinic patients. Coping behaviors were investigated as potential mediators of the relationship between PTSD and health as indicated by the number of health symptoms and number of medical conditions. The research literature has consistently revealed a robust relationship between PTSD and self-reported physical health perceptions and symptoms. However, there have been fewer studies investigating the relationship between PTSD and medical conditions. Therefore, this study was designed to replicate and extend previous findings on self-reported health symptoms and medical conditions, both self-reported and physician-diagnosed.

Based on the literature reviewed above, it is hypothesized that:

1. PTSD symptom severity will predict poorer physical health as measured by the number of self-reported physical symptoms, self-reported physical conditions, and the number of physician diagnosed medical conditions.
2. PTSD symptom severity will be positively related to emotion-focused, including avoidance, coping strategies and negatively related to problem-focused coping.
3. Coping responses will partially mediate the relationship between PTSD symptom severity and physical health as measured by the number of self-reported medical conditions and the number of physician diagnosed medical conditions.

CHAPTER TWO

METHOD

Participants

A total of 134 participants from general and women's health clinics at the Department of Veterans Affairs Medical Center in Palo Alto and Menlo Park completed the study.

Measures

PTSD. *Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995).* The CAPS is a semi-structured clinical interview that provides both a dichotomous measure of PTSD status and a continuous measure of severity of PTSD symptoms. Trained masters and doctoral level research staff administered the CAPS interviews. The CAPS assesses the severity and frequency of 17 cardinal symptoms of PTSD: Criterion B, re-experiencing symptoms; Criterion C, avoidance and numbing symptoms; and Criterion D, symptoms of increased arousal. The interviewer evaluates each symptom on frequency (0 = never, 4 = daily) and intensity (0 = none, 4 = extreme) using a 5-point Likert scale. In the present study, a continuous measure of PTSD

symptom severity was used. This was calculated by summing the number of symptoms that met the minimal frequency rating of “once” and an intensity rating of “moderate” distress (range 0-17; $\alpha = .93$).

Since its development, the CAPS has been shown to have excellent internal consistency, high test-retest reliability, convergent validity with other indices of PTSD, and good concordance with the diagnosis of PTSD derived from the Structured Clinical Interview for Diagnosis (Blake et al., 1995; Weathers, Keane, & Davidson, 2001). In order to determine inter-rater reliability, interviews were audio taped and reviewed by blind Ph.D. level psychologists and blind trained master’s degree level research assistants. In this study of primary care patients, inter-rater reliability for presence or absence of current PTSD, as determined by the CAPS, was high ($\kappa = .85$).

Psychopathology. Comorbid psychopathology was assessed using the Composite International Diagnostic Interview – Short Form (CIDI-SF; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). This interview is a series of short-form screening scales for DSM-IV psychiatric disorders and DSM-III-R substance use disorders developed from the World Health Organization’s Composite International Diagnostic Interview (CIDI). These screening scales assess for past year major depression, generalized anxiety, specific and social phobia, agoraphobia, panic disorder, and alcohol and drug dependence. In the following analyses, a summary score of symptoms was used for depression (0-4) and panic disorder (0-6); higher scores indicate a greater probability of meeting DSM-IV criteria for the disorder. The GAD score (0-1) is reported as a probability of caseness for the disorder.

Health Measures. *Self-report.* The Health Symptom Checklist (HSC; Bradburn, 1969; Bartone, Ursano, Wright, & Ingraham, 1989) was used to calculate a summary score of physical

health symptoms. The summary score was significantly skewed therefore the variable was recoded into a dichotomy indicating the presence or absence of self-reported health symptoms. These items measure commonly reported physical health symptoms (e.g. cold, flu, dizziness, and skin rashes). Internal consistency for the HSC in this study was high ($\alpha=.94$).

The measure of self-reported medical conditions was adapted from the NVVRS (Kulka et al., 1990), the National Health Survey, and the Department of Veterans Affairs National Health Survey of Gulf war veterans. On this self-report measure, participants indicated if they have a particular condition, whether a physician, themselves, or both diagnosed it, and whether it has been a problem for them in the past month. Participants were asked about a broad array of physical conditions, including cardiovascular (e.g., high blood pressure), respiratory (e.g., asthma), gastrointestinal (e.g., ulcers), and musculoskeletal (e.g., chronic back problems). Summary scores will be calculated by summing the number of health conditions that are endorsed, including those reported as diagnosed by a physician, themselves, or both (range 0-18).

Physician Diagnosed. Medical diagnoses for the 12 months following the index visit were extracted from VA databases and were grouped into the following disorder categories based on the International Classification of Diseases - 9th Revision (ICD-9-CM; World Health Organization, 1988): blood, circulatory system, digestive system, endocrine/metabolic, genitourinary, infectious/parasitic, injury/poisoning, nervous system, respiratory system, skin/musculoskeletal/tissue, and neoplasm diagnosis. A summary score of the total number of diagnostic categories was created (range 0-11).

Coping Measure. *Coping Responses Inventory* (CRI; Moos, 1993) measures coping behaviors corresponding to contemporary theories that emphasize the multidimensional aspects

of appraisal and the process of coping. This measure combines the two prominent approaches to classifying coping; it assesses the focus of coping (problem-focused or emotion-focused) and the method of coping (cognitive or behavioral). The CRI assesses four types of coping behavior: Positive Reappraisal, Problem Solving Action, Cognitive Avoidance, and Emotional Discharge. The positive reappraisal scale measures cognitive attempts to reappraise a problem in a positive way and contains questions such as, “Did you tell yourself things to make yourself feel better?” and “Did you tell yourself that things would get better?” The problem solving scale measures behavioral attempts to deal directly with the problem and includes questions like, “Did you make a plan of action and follow it?” and “Did you try at least two different ways to solve the problem?” The cognitive avoidance scale measures cognitive attempts to avoid thinking about the problem and contains questions such as, “Did you try to forget the whole thing?” and “Did you try to deny how serious the problem really was?” The emotional discharge scale measures behavioral attempts to relieve stress by expressing negative feelings and includes questions such as, “Did you yell or shout to let off steam?” and “Did you take it out on other people when you felt angry or depressed?” This measure assesses coping from a contextual framework whereby participants indicate coping behavior used to deal with the most stressful situation or most important problem in the previous 12-month period. Scoring procedures for each scale are outlined in Moos’ (1993) *Coping Responses Inventory Adult Form Manual*.

In the current study, participants were asked to indicate the coping behaviors used to deal with the most stressful situation or most important problem in the previous 12-month period. Coping was assessed with the four scales: Positive Reappraisal (alpha = .84), Problem Solving Action (alpha = .87), Cognitive Avoidance (alpha = .79), and Emotional Discharge (alpha = .67). The scores for each scale were calculated, as described by Moos (1993), by summing the

responses to each item (0=No, 1= Once or twice, 2=Sometimes, 3=Fairly often) and scale scores ranged from 0 to 18.

Data Collection Procedures

Recruitment. Research assistants approached patients in the primary care and women's health clinic waiting rooms at the Palo Alto and Menlo Park Divisions of Department of Veterans Affairs Medical Center. Patients were excluded from participating in the study if the participant lived too far away and could not travel to the VA, was not fluent in English, had cognitive impairment, if the phone number provided was invalid, and if they were participating in another research study. The sample included in this study comprises 57% (N=134) of the total number of people who completed the screening procedure and did not meet exclusion criteria (N=237). Oral and written consent to participate in the study of traumatic stress and health in primary care was elicited from each participant. During this initial contact, those who agreed to participate were asked to fill out a brief questionnaire. The initial PTSD screen contained two separate scales, the PTSD-Primary Care (PTSD-PC; Prins et al., 1999) and a short screening scale for DSM-IV PTSD that was developed by Breslau and colleagues (1999). The screen contained 12 questions with the response options of *Yes* or *No*. Attempts were made to contact all participants who completed the initial screen for the interview questionnaire portion of the study.

Interview. Diagnostic interviews, including the CAPS, were conducted with each participant that agreed to participate in the interview portion of the study. Trained masters' or doctoral level research staff interviewed participants. Interviews were completed approximately 1-month after the initial screen was completed.

Questionnaire Battery. After the interview, participants completed a questionnaire battery that consisted of measures for physical health symptoms, physical health conditions, medical service use, health related quality of life, alcohol and drug use, life stress and social support, coping resources, anger, health habits and demographics.

Medical Diagnoses. Clinical characteristics were extracted from the national VA databases. Information on diagnoses for the 12 months following the index visit was also extracted. Medical diagnosis were grouped into the following disorder categories: blood, circulatory system, digestive system, endocrine/metabolic, genitourinary, infectious/parasitic, injury/poisoning, nervous system, respiratory system, skin/musculoskeletal/tissue, and neoplasm diagnosis.

Power

Using multiple regression analyses with 2 covariates, the sample size of 134 in this study will have 80% power to detect a medium to large effect size (increment in $R^2 = .10$)

Data Analysis

First the demographics of the sample and zero-order correlations between the study variables will be presented. Second the relationships between PTSD and health outcome variables will be presented followed by the relationships between PTSD and coping behavior variables. Third, the findings on the relationships between coping behavior variables and health outcome variables will be presented. Fourth, the mediation analyses will be presented. Fifth, the results for the relationship between PTSD and comorbid psychopathology will be presented. Finally, results for healthcare utilization in relation to PTSD will be presented.

CHAPTER THREE

RESULTS

A total of 134 participants, 61% female, from general and women's health clinics at the Department of Veterans Affairs Medical Center in Palo Alto and Menlo Park completed the study. The majority of the sample was Caucasian (63 %; N = 84); the remaining were African-American/Black (19%; N=26) Asian-American (6%; N=8); Hispanic/Latino (5%; N=4); and Native-American (2%; N=2) participants. The mean age of the sample was 52 years (SD = 14.98), ranging from 22 to 85 years of age. Using structured clinical interview to determine diagnoses for PTSD, 33 (25%) participants met full criteria for current PTSD. The lifetime prevalence for potentially traumatic life event exposure in this sample was 86%.

Zero-order correlations were examined among the study variables (Table 1). PTSD symptom severity was significantly associated with self-reported health symptoms, $r(133)=.30$, $p<.001$, self-reported medical conditions, $r(134)=.21$, $p<.05$, emotional discharge, $r(131)=.43$, $p<.01$, and cognitive avoidance, $r(131)=.43$, $p<.01$ coping subscales. Emotional discharge coping was significantly associated with self-reported health symptoms, $r(131)=.32$, $p<.001$. Cognitive avoidance coping was significantly associated with self-reported medical conditions, $r(131)=.22$, $p<.05$. Neither positive reappraisal nor problem solving coping was associated with health outcome measures. Self-reported medical conditions were significantly associated with physician-diagnosed medical conditions, $r(134)=.27$, $p<.01$ and self-reported health symptoms, $r(131)=.34$, $p<.001$. These analyses support previous research findings on the association between PTSD, coping, and health.

To identify potential covariates, correlations between demographic (age, ethnicity, education, relationship status, and gender), coping variables and health outcomes were examined

(see Table 2). Age was significantly associated with the total number of physician-diagnosed medical conditions, $r(133)=.35$, $p<.01$, self-reported health symptoms $r(133)= -.23$, $p<.01$, the cognitive avoidance coping scale, $r(131)= -.18$ $p<.05$, and the emotional discharge coping scale, $r(131)=-.33$, $p<.01$. Thus, age was retained as a covariate in the following analyses.

PTSD and Health

Logistic regression was conducted to examine PTSD symptom severity and age as predictors of self-reported health symptom status (Table 3). PTSD was significantly associated with the presence of self-reported health symptoms but age was not associated with health symptom status. The overall percentage of cases correctly classified by the model was 63%.

Multiple regression was conducted to examine PTSD symptom severity as a predictor of poorer physical health as measured by the number of self-reported medical conditions after controlling for age (Table 3). Age was not a significant predictor of self-reported medical conditions, $R^2 = .00$, $\Delta R^2=.00$, $F_{inc}(1, 130) = .00$. However, PTSD symptom severity significantly predicted number of self-reported medical conditions, $R^2 = .05$, $\Delta R^2=.05$, $F_{inc}(1, 130) = 6.53$, $p < .05$.

Multiple regression was conducted to examine PTSD symptom severity as a predictor of poorer physical health as measured by the number of physician-diagnosed medical conditions after controlling for age (Table 3). Age significantly predicted a greater number of physician-diagnosed medical conditions, $R^2 = .12$, $\Delta R^2=.12$, $F_{inc}(1, 130) = 17.83$, $p < .001$. After controlling for age, PTSD symptom severity significantly added to prediction of physician-diagnosed medical conditions, $R^2 = .17$, $\Delta R^2=.05$, $F_{inc}(1, 130) = 7.90$, $p < .01$.

Overall, results revealed that PTSD symptom severity significantly predicted self-reported health symptoms, self-reported medical conditions, and physician-diagnosed medical conditions after controlling for age.

PTSD and Coping

Multiple regression was conducted to examine PTSD symptom severity as a predictor of the coping resources subscales after controlling for age (Table 4). First, cognitive avoidance coping was examined. Age was significantly associated with less use of cognitive avoidance coping, $R^2 = .03$, $\Delta R^2 = .03$, $F_{inc}(1, 128) = 4.51$, $p < .05$. After controlling for age, PTSD symptom severity significantly predicted Cognitive Avoidance coping, $R^2 = .19$, $\Delta R^2 = .16$, $F_{inc}(1, 128) = 25.02$, $p < .001$. Multiple regression was conducted to examine PTSD symptom severity and age as predictors of Emotional Discharge coping behavior (Table 4). Age was significantly associated with less use of Emotional Discharge coping, $R^2 = .11$, $\Delta R^2 = .11$, $F_{inc}(1, 128) = 16.03$, $p < .001$. After controlling for age, PTSD symptom severity added to prediction of Emotional Discharge coping, $R^2 = .23$, $\Delta R^2 = .12$, $F_{inc}(1, 128) = 19.71$, $p < .001$; PTSD symptom severity predicted greater use of emotional discharge coping.

Multiple regression analyses were conducted to examine PTSD symptom severity as a predictor of Problem Solving and Positive Reappraisal coping behaviors after controlling for age (Table 4). Neither PTSD symptom severity nor age was a significant predictor of problem solving or positive reappraisal coping. Overall, results revealed that PTSD symptom severity significantly predicted cognitive avoidance and emotional discharge coping after controlling for age.

Coping and Health

Multiple regressions were conducted to examine coping behavior as predictors of poorer physical health as measured by the number of self-reported health symptoms, the number of self-reported medical conditions, and the number of physician-diagnosed medical conditions after controlling for age. Each coping subscale (i.e. Cognitive Avoidance, Emotional Discharge, Problem Solving, and Positive Appraisal) was examined as a predictor of each health outcome measure (i.e. number of self-reported health symptoms, the number of self-reported medical conditions, and the number of physician-diagnosed medical conditions).

Self-Reported Health Symptoms

Logistic regression was conducted to examine Emotional Discharge coping and age as predictors of self-reported health symptom status (Table 5). Emotional Discharge coping was significantly associated with the presence of self-reported health symptoms but age was not associated with health symptom status. The overall percentage of cases correctly classified by the model was 59%.

Cognitive Avoidance, Problem Solving, and Positive Reappraisal were not associated with presence of self-reported health symptoms and therefore were not investigated as predictors.

Self-Reported Medical Conditions

Multiple regression was conducted to examine Cognitive Avoidance as a predictor of self-reported medical conditions. Age was not a significant predictor of self-reported medical conditions, $R^2 = .00$, $\Delta R^2 = .00$, $F_{\text{inc}}(1, 128) = .02$. After controlling for age, Cognitive Avoidance added to the prediction of self-reported medical conditions, $R^2 = .05$, $\Delta R^2 = .05$, $F_{\text{inc}}(1, 128) = 6.67$, $p < .05$.

Multiple regressions were conducted to examine Emotional Discharge, Problem Solving, and Positive Reappraisal as predictors of self-reported medical conditions after controlling for age. None were a significant predictor of health conditions. Overall, results revealed that Cognitive Avoidance significantly predicted number of self-reported medical conditions after controlling for age.

Physician-Diagnosed Medical Conditions

Multiple regressions were conducted to examine Cognitive Avoidance, Emotional Discharge, Problem Solving, and Positive Reappraisal as predictors of physician-diagnosed medical conditions after controlling for age. None of the coping subscales were significantly associated with physician-diagnosed medical conditions.

PTSD, Coping, and Health: Mediation Analysis

Multiple regressions were conducted to examine the extent to which the relationship between PTSD symptom severity and poorer physical health as measured by the number of self-reported health symptoms and the number of self-reported medical conditions was mediated by coping behaviors. For coping to be a mediator between PTSD and adverse health it must meet the following criteria (Barron & Kenney, 1986). First, PTSD must significantly predict the health outcome measures. Second, PTSD must also significantly predict coping behaviors. Third, coping behavior must predict health outcome measures. Finally, when the health measures are regressed on both PTSD and coping the equations must be statistically significant, coping must exert a significant effect on the health measure, and the variance in health measure accounted for by PTSD must be reduced or non-significant. The significance of the mediated effect (i.e., the difference in the regression coefficient relating PTSD to health with and without coping in the model) was tested using MacKinnon and Dwyer's (1993) method.

The results described previously revealed that PTSD was a significant predictor of self-reported health symptoms, self-reported medical conditions, and physician-diagnosed medical conditions. PTSD was also found to predict both cognitive avoidance and emotional discharge coping. Emotional Discharge coping was found to be a significant predictor of the presence of self-reported health symptoms and cognitive avoidance coping was a significant predictor of self-reported medical conditions. Therefore, the mediated effect of PTSD on self-reported health outcome measures was examined. First, the effect of PTSD symptom severity before and after entering the emotion focused coping variable (the potential mediator) into the regression predicting the presence of self-reported health symptoms was examined (Table 6). The mediated effect of PTSD on self-reported health symptoms was significant for emotional discharge coping, $t(134) = 2.5, p < .001, 40\%$ mediated. Next, the effect of PTSD symptom severity before and after entering the cognitive avoidance coping variable (the potential mediator) into the regression predicting self-reported medical conditions was examined (Table 6). The mediated effect of PTSD on self-reported medical conditions was significant for cognitive avoidance coping, $t(134) = 2.55, p < .05, 41\%$ mediated.

Comorbid Psychopathology

PTSD is highly comorbid with major depression, generalized anxiety, and panic disorder (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Additionally, depression and anxiety have been associated with substantial health risks (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). Therefore, depression, generalized anxiety, and panic disorder were investigated as potential third variables in the relationship between PTSD and self-reported health symptoms and self-reported medical conditions. Major depression was significantly correlated with self-reported health symptoms $r(133) = .37, p < .001$ and self-reported medical conditions $r(134) = .35,$

$p < .001$. Generalized anxiety disorder was significantly correlated with self-reported health symptoms $r(132) = .37$, $p < .001$. Panic disorder was also correlated with self-reported health symptoms $r(132) = .29$, $p < .001$.

Partial correlation analyses revealed that the relationship between PTSD and both self-reported symptoms and conditions is accounted for by depression, generalized anxiety disorder, and panic disorder. When controlling for depression, GAD, and panic the relationship between PTSD and self-reported health symptoms was rendered non-significant $r(127) = -.01$. The relationship between PTSD and self-reported health conditions was also rendered non-significant $r(128) = .005$. In summary, when controlling for comorbid psychopathology the relationship between PTSD and self-reported health is non-significant.

Health Care Utilization

There is strong support in the research literature for the relationship between PTSD and increased physical health care utilization; therefore, healthcare utilization (number of primary care visits in the last 12 months) was examined as a potential third variable that may explain the relationship between PTSD and physical health. Number of primary care visits in the past 12 months was significantly correlated with self-reported health symptoms $r(122) = .18$, $p < .05$ and self-reported medical conditions $r(122) = .28$, $p < .01$; however, it was not correlated with physician-diagnosed conditions. Number of primary care visits was not significantly associated with PTSD symptom severity.

Self-Reported Health Symptoms

Logistic regression was conducted to examine PTSD symptom severity, age, and number of primary care visits in the past 12 months as predictors of self-reported health symptom status (Table 6). Both age and primary care visits were significantly associated with the presence of

self-reported health symptoms but PTSD was not associated with health symptom status. The overall percentage of cases correctly classified by the model was 62%.

Self-Reported Medical Conditions

Multiple regression was conducted to examine PTSD symptom severity as a predictor of the number of self-reported medical conditions after controlling for age and number of primary care visits. Age was not a significant predictor of self-reported medical conditions, $R^2 = .00$, $\Delta R^2 = .00$, $F(1, 117) = .33$. However, number of primary care visits significantly predicted a greater number of self-reported medical conditions, $R^2 = .08$, $\Delta R^2 = .08$, $F(1, 117) = 10.53$, $p < .01$. When controlling for both age and number of primary care visits, PTSD symptom severity significantly added to the prediction of the number of self-reported medical conditions, $R^2 = .11$, $\Delta R^2 = .03$, $F(1, 117) = 4.07$, $p < .05$.

Physician-Diagnosed Medical Conditions

Multiple regression was conducted to examine PTSD symptom severity as a predictor of the number of physician-diagnosed medical conditions after controlling for age and number of primary care visits. Number of primary care visits was not a significant predictor of physician-diagnosed conditions.

CHAPTER FOUR

DISCUSSION

The objective of this study was to investigate the relationship between PTSD, physical health, and coping among VA general medical and women's health clinic patients. This study was designed to replicate and extend previous findings on the relationship between PTSD and self-reported health symptoms, self-reported medical conditions, and physician-diagnosed

medical conditions. Another goal of this study was to investigate coping behaviors as potential mechanisms relating PTSD to physical health.

It was hypothesized that PTSD symptom severity would predict self-reported physical health symptoms and self-reported medical conditions. As PTSD symptom severity increased individuals in this sample were more likely to report health symptoms. Additionally, as PTSD symptom severity the number of medical conditions reported also increased. Therefore, the results of this study replicate previous research findings (Green & Kimmerling, 2004). The results also support the emerging evidence of a relationship between PTSD and physician-diagnosed medical conditions. In this study, as PTSD symptom severity increased the number of medical conditions diagnosed by a physician also increased. This result adds to the relatively sparse literature on the relationship between PTSD and physician-diagnosed conditions. This finding is important to the hypothesized relationship between PTSD and adverse health because it demonstrates a relationship that is not based exclusively on self-report. However, further evidence of the connection between PTSD and health based on objective health measures is needed. Additionally, the link between PTSD and specific diseases should be established. Overall, the results of this study have shown an association between PTSD and poorer physical health and these results are consistent with previous research.

The second hypothesis of this study was that PTSD symptom severity would be positively related to emotion-focused and avoidance coping strategies, and negatively related to problem-focused coping. Consistent with previous research, PTSD symptom severity was associated with emotion focused and cognitive avoidance coping behaviors. As PTSD severity increased the use of emotion focused and avoidance coping strategies also increased. PTSD symptom severity was negatively associated with problem solving and positive reappraisal

coping but this relationship did not reach significance. The relationship between emotion-focused and avoidance coping behaviors and the severity of PTSD is important because it establishes the foundation for the investigation of coping as a mediator in the PTSD and health relationship. The relationship between PTSD and coping also has implications for treatment; coping strategies can be taught thereby possibly either improving PTSD symptomology and/or potentially preventing adverse health consequences.

Finally, it was hypothesized that coping responses would partially mediate the relationship between PTSD symptom severity and physical health as measured by the number of self-reported health symptoms, self-reported medical conditions, and physician diagnosed medical conditions. Results revealed that emotion focused and cognitive avoidance coping behaviors partially explain the relationship between PTSD and self-reported health problems. These results suggest that the coping strategies employed may have direct and indirect effects on health outcomes. Based on the allostatic load model, ineffective coping techniques may maintain physiological abnormalities associated with PTSD symptoms and over time this dysregulation may directly increase the risk for physical illness (Friedman & Schnurr, 1995). Alternatively, avoidant coping strategies may increase health risk behaviors (i.e., substance use and smoking) that are known to have adverse health consequences, thereby indirectly increasing the risk for illness. If replicated, these results could impact the treatment of PTSD. Given that coping strategies partially explain the relationship between PTSD and adverse health, it may be beneficial for clinicians to teach adaptive coping strategies to those with PTSD before adverse health consequences arise. In the meantime, more research is needed to understand the effects of coping on the PTSD and health relationship.

Existing literature strongly suggests that PTSD contributes to poorer health; however, the effect of PTSD on health is typically reduced when other disorders are controlled, suggesting that at least part of the relationship between PTSD and health is a function of psychological distress or psychiatric disorder more generally. Although largely ignored, there have been some studies that have investigated the specificity of the impact of PTSD on health by controlling for other psychopathology. Studies have shown that PTSD contributes to health problems after controlling for a variety of psychological disorders (i.e. substance abuse, depression, anger, anxiety) for both veteran and civilian samples (Andreski, Chilcoat, & Breslau, 1998; Zatzick, Marmar, et al. 1997a; Zatzick, Weiss, et al. 1997b; Zayfert, Dums, Ferguson, & Hegel, 2002; Zoellner, Goodwin, & Foa, 2000).

In this study, when depression, panic disorder, and generalized anxiety disorder were controlled, the relationship between PTSD and self-reported health was rendered non-significant. Contrary to the studies described earlier, the impact of PTSD on health, in this study, was not unique. To evaluate the discrepancy between the results of prior research and the results of this study a principal component analysis (PCA) was conducted. The goal of this post-hoc analysis was to ascertain whether PTSD and other psychiatric disorders were operating as separate unique factors. In this study, only one component emerged when PTSD, depression, panic disorder, and generalized anxiety disorder were analyzed. This suggests that psychological distress or psychopathology in general may be the component that was measured. Although it is possible that only one component emerged because of measurement error, it is more likely due to the high comorbidity or the overlap of symptoms of these disorders since valid and reliable measures were used. This discrepancy highlights the need for further research to distinguish the effects of PTSD from the effects of other psychiatric symptoms and/or disorders, particularly depression,

on health. This issue has been largely been ignored in the trauma literature (Schnurr & Green, 2004).

There are several limitations in the design of this study that are important to note. The data in this study are cross-sectional therefore causality cannot be inferred. The sample size was small with relatively low power to detect significant relationships. More research is needed using larger samples. Additionally, the use of PTSD severity instead of the diagnosis of PTSD may have impacted the results. In terms of measurement, the identification and reporting of coping behaviors, at this point, is problematic (see Skinner, Edge, Altman, & Sherwood, 2003 for a thorough discussion) therefore the impact of coping in the PTSD and health relationship may be minimized or distorted. Furthermore, a summary of physician-diagnosed conditions was used rather than specific conditions, which may have obscured significant associations. Thus, more research is needed on specific conditions.

Given the data in this study are cross-sectional, it is unknown whether PTSD symptoms preceded the health conditions or vice-versa. Additionally, selection bias may exist in the sample. Individuals with PTSD and medical problems combined may be more likely to seek care than persons with PTSD alone thus creating the false impression that PTSD is associated with poorer physical health. To address these issues, longitudinal studies of PTSD and health are needed. The relationship between PTSD and self-reported health, in this study, was largely accounted for by comorbid psychiatric disorders. Additional research is needed to investigate the specificity of the effect of PTSD on health, in addition to the effects of disorders that are often comorbid with PTSD while accounting for overlapping symptoms. Future research should investigate depression, PTSD, and health by comparing individuals with depression to persons with and without a history of trauma and co-occurring PTSD.

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Table 1 Correlation matrix for study variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. PTSD	-----											
2. Cognitive Avoidance	.43**	-----										
3. Emotional Discharge	.43**	.60**	-----									
4. Positive Reappraisal	-.13	.34**	.26**	-----								
5. Problem Solving	-.14	.17*	.27**	.66**	-----							
6. Self-reported Health Symptoms	.30**	.15	.32**	-.06	.04	-----						
7. Self-reported Medical Conditions	.21**	.27*	.13	.07	.02	.34**	-----					
8. Physician-diagnosed Conditions	.10	.02	-.16	-.02	-.11	.11	.27**	-----				
9. Depression	.62**	.47**	.47**	.07	.02	.37**	.35**	-.004	-----			
10. Generalized Anxiety	.60**	.34**	.41**	-.002	-.12	.37**	.16	.14	.53**	-----		
11. Panic	.45**	.34**	.36**	.01	-.12	.29**	.14	-.01	.44**	.41**	-----	
12. Healthcare Utilization	.12	.21*	.04	-.01	.03	.18*	.28**	.17	.12	.04	.01	-----

Note: *p<.05, **p<.01

Table 2 Correlation Matrix for Demographic, Coping, and Health Outcomes

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	-----											
2. Gender	-.30**	-----										
3. Ethnicity	-.19*	.12	-----									
4. Relationship Status	.26**	.01	-.14	-----								
5. Education	.18*	-.05	-.22*	.00	-----							
6. Cognitive Avoidance	-.18	.01	.06	-.09	-.04	-----						
7. Emotional Discharge	-.33**	.10	.08	-.12	-.08	.60**	-----					
8. Positive Reappraisal	-.05	-.08	-.07	-.09	.05	.34**	.26**	-----				
9. Problem Solving	-.04	-.06	-.20*	-.03	.03	.17*	.27**	.66**	-----			
10. Self-reported Health Symptoms	-.23**	.07	.01	-.02	-.01	.15	.32**	-.06	.04	-----		
11. Self-reported Medical Conditions	.000	.15	-.18*	.04	.08	.22*	.13	.07	.02	.34**	-----	
12. Physician-diagnosed Conditions	.35**	-.08	-.10	.23**	-.02	.02	-.16	-.02	-.11	.11	.27**	-----

Note: *p<.05, **p<.01

Table 3 Logistic and Multiple Regression Analyses Examining PTSD Symptom Severity as a Predictor of Health Outcomes

Health Outcomes	B	(SE)	OR (95% CI)	p
Self-Reported Symptoms PTSD	.10	.04	1.11(1.03-1.2)	.007**
	β	R²	ΔR^2	ΔF
Self-Reported Conditions PTSD	.23	.05	.05	6.5*
Physician-Diagnosed Conditions PTSD	.24	.17	.05	7.9**

Note: *p<.05, **p<.01; Analyses control for age.

Table 4 Multiple Regression Analyses Examining PTSD Symptom Severity as a Predictor of Coping Behaviors

Coping Behaviors	β	R^2	ΔR^2	ΔF
Cognitive Avoidance PTSD	.42	.19	.16	25.02***
Emotional Discharge PTSD	.36	.23	.12	19.71***
Positive Reappraisal PTSD	-.16	.02	.02	2.94
Problem Solving PTSD	-.17	.03	.03	3.54

Note: *** $p < .001$; Analyses control for age.

Table 5 Logistic and Multiple Regression Analyses Examining Coping Behaviors as Predictors of Health Outcomes

	B	(SE)	OR (95% CI)	p
Self-Reported Symptoms				
Cognitive Avoidance	.05	.04	1.05 (.97-1.14)	.19
Emotional Discharge	.16	.05	1.18 (1.06-1.31)	.003
Positive Reappraisal	-.03	.04	.97 (.90-1.04)	.43
Problem Solving	.01	.04	1.02 (.94-1.09)	.67
	β	R²	ΔR²	ΔF
Self-Reported Conditions				
Cognitive Avoidance	.23	.05	.05	6.67*
Emotional Discharge	.15	.02	.02	2.67
Positive Reappraisal	.07	.01	.01	.73
Problem Solving	.02	.00	.00	.04
Physician-Diagnosed Conditions				
Cognitive Avoidance	.09	.13	.01	1.06
Emotional Discharge	-.05	.12	.00	.31
Positive Reappraisal	-.02	.12	.00	.00
Problem Solving	-.09	.13	.01	1.26

Note: *p<.05; Analyses control for age.

Table 6 Significant Mediators (Coping Behaviors) of PTSD on Health Outcomes

Health Outcomes	Mediated Effect	σ	% mediated
Self-Reported Symptoms			
Emotional Discharge	.04	.02	40
Self-Reported Conditions			
Cognitive Avoidance	.09	.03	41

Note: * $p < .05$, ** $p < .01$; Analyses control for age. Mediated effect = difference between the regression coefficient relating PTSD to health before and after adding coping; σ = standard error of the mediated effect; % mediated = mediated effect/total effect.