

THE RELATIONSHIPS BETWEEN POST-TRAUMATIC STRESS, DEPRESSION  
SYMPTOMS AND PHYSICAL HEALTH OVER TIME IN WOMEN WITH  
INTIMATE PARTNER VIOLENCE

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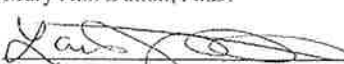
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ABSTRACT

The current study examined the associations between post-traumatic stress and depression symptoms and physical health in the context of a longitudinal study of battered women's experiences over time. Two hundred and forty-nine help-seeking women who had experienced intimate partner violence (IPV) within the last year were interviewed. Cross-sectional and longitudinal regression analyses examined how battered women's mental health symptoms predicted health outcomes and vice versa. Common experiences reported by women with IPV were controlled for including severity of violence, substance use and childhood violence.

Results obtained suggest different outcomes for concurrent and short and long-term analyses. Concurrent results show that PTSD was uniquely associated with physical health. Short-term analyses (4-6 months) revealed an association between depression symptoms and physical health outcomes whereas long-term analyses (1.5 years) suggest that physical health is most influenced by the underlying distress shared by PTSD and depression symptoms. These differential findings suggest that the passage of time may be

influential when examining the complex relationship between mental health symptoms and physical health in an IPV population.

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## CHAPTER 1

### INTRODUCTION

Intimate partner violence (IPV) impacts nearly 1.5 million women per year (Tjaden & Thoennes, 2000) and has necessitated increased research into the negative effects on mental and physical health. IPV has been associated with health problems ranging from direct injury to other cardiovascular, gastrointestinal, and urogenital symptoms and disorders (Campbell, 2002) as well as mental health symptoms such as PTSD and depression (Dutton, 2009). Certainly we know that mental health symptoms often impact physical health and vice versa. However, there is a need for research investigating the unique effects of PTSD and depression on physical health in IPV populations. In the current study, we followed women who have experienced violence over a period of 1.5 years, and we examined the relationships between PTSD, depression, and physical health over time.

#### **Physical and Mental Health Impact of IPV**

Intimate partner violence places women at significant risk for the development of adverse physical and mental health outcomes. Eby (2004) examined physical health differences between women with and without IPV (current and previous) and findings indicate that women with IPV are more susceptible to illness (e.g. colds, stomach upset, headaches) despite lack of significant differences with respect to serious illness or injury.

Another recent cross-sectional study assessed different types of IPV and physical health problems (Bonomi, Anderson, Rivara & Thompson, 2007). Results indicated that health scores reported by women with lifetime exposure to sexual IPV or combined physical and sexual IPV were comparable to scores for individuals with chronic back pain, some forms of cancer, diabetes, heart disease, hypertension, osteoarthritis, and rheumatoid arthritis. Coker, Smith, Bethea, King and McKeown (2000) evaluated women in a primary care setting and compared women with past and/or present IPV and women with no current or previous IPV regarding physical health. Women with any form of IPV, including psychological abuse alone, reported worse physical and mental health.

Furthermore, the health consequences of IPV have been proposed to extend far beyond temporal proximity to the occurrence of abuse (Campbell, 2002).

Although more recent abuse certainly relates to a higher number of health problems, research suggests that women who have experienced any form of relational violence also remain less healthy over time (Campbell, 2002). In addition, the association between negative physical health consequences and IPV has remained despite controlling for physical injury (Kimerling & Calhoun, 1994; Wagner, Wolfe, Rotnitsky, Proctor, Erickson; 2000; Sutherland, Bybee & Sullivan, 2003).

These findings have prompted additional research to examine the potential pathways through which IPV can impact physical health. There is a growing body of literature that has focused on the role of mental health symptoms, such as PTSD and depression, as potential mediators in the relationship between IPV and health problems. Although the relationship between trauma and health has been widely examined in other

trauma-exposed populations, such as military samples (Taft, Vogt, Mechanic, & Resick; 1999; Wagner et al., 2000), only recently has the literature pertaining to IPV begun to address this relationship. Further, the majority of the studies on PTSD, depression, and health in trauma populations have assessed these variables concurrently. In the current study, we assessed women over the course of 4-6 months and 1.5 years to evaluate the cross-sectional and *prospective* relationships between mental health symptoms and physical health among women with recent IPV. We also argue that it is important to study the *reciprocal relationship* between mental and physical health in this population, so we will evaluate how mental health influences physical health, and vice versa.

### **PTSD and Physical Health Outcomes**

Rates of PTSD among women with IPV are elevated in comparison to the general population (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). A 1999 meta-analysis by Golding reported that 31% to 84.4% of women who experienced IPV met PTSD criteria (the weighted mean prevalence was reported to be 63.8%) compared to a lifetime prevalence rate of 1-12% in the general population. The physical health impact and cost, in terms of frequency of health utilization as well as disability, is high for PTSD.

Research has consistently shown an association between chronic PTSD and higher lifetime prevalence rate of chronic pain, cardiovascular, respiratory, gastrointestinal, musculoskeletal, and infectious diseases (Litz, 1992; Lauterbach, Vora & Rakow, 2005).

Investigations among different trauma groups have found PTSD to be predictive of physical health problems (Schnurr & Green, 2004). Several studies have found that PTSD significantly impacts the number of physical symptoms, course and impact of an

illness, and susceptibility to illness in trauma survivors (Green & Kimerling, 2004; Eby, 2004; Schnurr & Jankowski, 1999). Increasing evidence suggests that it is the development of PTSD as opposed to trauma exposure (aspects of traumatic experience or physical injury) that results in health-related difficulties among trauma survivors (Taft, Stern, King, & King, 1999; Wolfe, Schnurr, Brown & Furey, 1994). Taft (1999) assessed PTSD and health in a sample of military veterans and found that PTSD mediated the relationship between combat trauma and physical health. Zoellner (2000) found a similar relationship when evaluating a group of treatment-seeking non-partner sexual assault survivors. Using a large sample of Gulf War veterans, Wagner et al. (2000) examined PTSD and health upon returning from the war and two years later. Results indicated that Time 1 PTSD symptoms predicted health symptoms two years later.

Wolfe et al. (1994) evaluated a sample of female Vietnam veterans and examined PTSD and degree of war zone exposure in predicting physical health. When predictors were examined separately, all were positively associated with physical health outcomes. However, when all predictors were assessed simultaneously, only PTSD significantly predicted self-reported health symptoms. Finally, a recent study examined the health status of 4,462 male Vietnam-era veterans 30 years after their military service. Findings indicate that having PTSD was an equally good indicator of a person's long-term health status as having an elevated white blood cell count (Boscarino, 2008).

Several theories have been developed to explain PTSD's mediating role in the relationship between trauma and physical outcomes. Some have proposed that PTSD symptoms might lead to other risky and negative health behaviors (e.g. substance abuse, smoking) that can lead to proven negative health consequences. Some researchers have

also argued that the impact of PTSD on allostatic load might explain the link between trauma exposure and health outcomes (Dutton, 2009; Schnurr & Green, 2004; Wolfe et al., 1994). The concept of allostatic load, or accumulated stress, has led some to propose that the hyper-arousal symptoms associated with PTSD may leave an individual in a constant state of stress and anxiety. This state of arousal, also known as the “fight or flight” response, correlates with heightened sensitivity in the hypothalamic-pituitary-adrenal axis (HPA-axis), which manages reactions to stress. Over-reactivity or ongoing activity in the HPA axis has been linked to a variety of health consequences such as hyperthyroidism, diabetes, and Cushing syndrome (Brown, Varghese, & McEwen; 2004). As suggested by Campbell (2002), violence-related PTSD may lead to increased activity and sensitivity in the HPA-axis resulting in chronic pain symptoms.

While there is an extensive amount of support for the relationship between trauma, PTSD and physical health, less is known about this relationship in the context of IPV (Dutton, 2009). Sullivan and Holt (2008) point out that trauma research has “fallen prey to the ‘fiction of homogeneity’” and suggest that making assumptions about the generalizability of findings across all trauma populations (e.g. combat, non-partner sexual assault, natural disaster, IPV) may not capture significant differences between these groups. The type of trauma might impact how trauma symptoms, such as PTSD, impact physical health. For example, aspects of IPV, such as the interpersonal nature of IPV, may lead to higher levels of arousal and re-experiencing symptoms in common interpersonal interactions. Additionally, with IPV-type violence, there is a high likelihood of physical reminders of the abuse (e.g. injuries to the face) that could impact how physical health symptoms are experienced. In IPV populations, interpersonal interactions

as well as pain associated with injuries may remind women of emotions connected to the abuse, such as shame, anger, or fear, leading to increased activity in the HPA- axis.

There is tremendous value to understanding how the complex relationship between PTSD and health specifically manifests in an IPV population. In support of Sullivan and Holt's "fiction of homogeneity" assertion regarding trauma, Ozer, Best, Lipsey & Weiss' (2003) meta-analysis included an examination of the influence of type of traumatic event on the development of PTSD symptoms. Results demonstrated that the type of trauma predicted the development of PTSD and specifically found that interpersonal trauma had the most significant influence on the development of PTSD.

We suggest that IPV is categorically different from other forms of trauma. IPV typically occurs in the context of an ongoing intimate relationship and is associated with heightened risk for re-victimization. In addition, there are multiple forms of IPV (physical, sexual, psychological) that may occur simultaneously. A recent population-based sample of women in North Carolina indicated that of 18.4% who reported experiencing IPV, 1.9% reported experiencing physical violence in the absence of other forms of IPV (Smith, Thornton, DeVellis, Earp & Coker; 2002). Multiple forms of violence may lead to increased PTSD symptoms and health consequences (Campbell, 2002; Dutton, 2009). Furthermore, the likelihood of injury is high for women with IPV, and injury has been associated with increased likelihood of PTSD symptoms.

While less research has evaluated the influence of PTSD symptoms on physical health in IPV populations, there are a few studies that have attempted to clarify this complex relationship. Taft et al., (2007) examined PTSD symptoms and health symptoms in a sample of help-seeking women with interpersonal aggression (current and recent

physical and/or verbal aggression) over a period of 2 weeks. PTSD symptoms served as a mediator in the relationship between IPV and physical health symptoms. Campbell, Greeson, Bybee & Raja (2008) examined child abuse, adult sexual assault, intimate partner violence and sexual harassment in a predominantly African American sample of female veterans. Not only were women who experienced prior violence (e.g. child abuse) more likely to experience later violence in adulthood, but PTSD fully mediated the relationship between violence and physical health symptoms. Additionally, the more types/forms of violence that women experienced directly related to worse health outcomes. Kaysen et al. (2008) investigated the relationship between PTSD, alcohol use, and physical health outcomes in women with recent IPV (last 6 months). Results suggest that PTSD has a significant impact on health symptoms of women with recent IPV despite controlling for injury and alcohol use. Other studies that have specifically assessed women with IPV also provide support for increased PTSD and increased health impairments (Woods, et al., 2008; Laffaye, 2003; Stein & Kennedy, 2001).

However, as earlier noted, many of the studies that have assessed PTSD and health within the trauma literature are cross-sectional and retrospective in nature (Kaysen et al., 2008; Becker et al., 2010; Laffaye & Kennedy, 2003; Wuest, 2009; Dennis et al., 2009; Stein & Kennedy, 2001; Spitzer, 2009; Nixon et al., 2004; O'Campo et al., 2006; Taft et al., 2007). Further, there are few longitudinal studies that have examined PTSD and physical symptoms in an IPV sample and none that we are aware of that have investigated reciprocal relationships. While these retrospective findings provide support for the relationship between PTSD symptoms and physical health, these findings limit our understanding of the causal role of PTSD on health. Thus, we need to study how

PTSD influences health over time, and whether a reciprocal relationship exists such that changes in health also impacts mental health symptoms.

### **Depression and Physical Health Outcomes**

Depression has long been considered a major mental health consequence of IPV (Dienemann, et al., 2000). A recent meta-analysis that examined 18 studies (all utilizing IPV samples) found a mean prevalence of depression in 47.6% of abused women (Golding, 1999). This finding is in stark contrast to lifetime prevalence rates of depression in the general population estimated at 16% (National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health, 2006). Coker and colleagues (2002) reported that all types of IPV (physical, emotional, sexual, stalking) were associated with depression. Another recent study of 413 predominately African-American women with current and/or previous history of IPV reported the following prevalence rates: 45% of women reported moderate depression symptoms and 31% of women reported severe depression (Mechanic, Weaver, & Resick, 2008). Depression among women with IPV tends to be chronic with symptoms often continuing far after the abuse has ended (Campbell et al., 1997; Campbell, Sullivan, & Davidson, 1995). In addition to chronicity of symptoms, research suggests that depression severity in women with IPV is associated with severity of abuse (Deinemann, et al., 2000).

Depression has frequently been associated with overall poor immune functioning, increased utilization of medical resources, higher medical costs, poor health and functional difficulties in multiple populations (Greenberg et al., 1993). Research on the

health impact of depression has consistently demonstrated that depressive symptomatology can have a deleterious effect on physical health. A recent review by Brown et al. (2004) examined the vast literature linking depression to the later development of medical illness, particularly those related to HPA-axis functioning. The review found strong evidence (criteria for strong support was defined as having more than one study that supports the relationship between illness and major depressive disorder (MDD)) for an association between MDD and cognitive impairment, hippocampal atrophy, decreased bone mineral density, hypertension, and type 2 diabetes. Another finding resulting from this review suggests that depression precedes the onset of hypertension and diabetes and is not just a consequence of these illnesses (Davidson et al., 2000; Jonas et al., 1997, Kawakami et al., 1999). A recent report by the World Health Organization suggests that depression has a greater impact on overall physical health than diabetes, angina, asthma and arthritis. These results, based on interviews conducted with a sample of 250,000 individuals in 60 countries, suggests that depression alone is a better predictor of poor overall health than having one or more chronic health condition.

Due to high rates of depression in women with IPV and negative physical outcomes related to depression, some research has investigated the relationship between IPV, depression and physical health. Bonomi et al. (2007) examined a sample of 3429 women recruited from a large health plan to assess the relationship between IPV exposure, health symptoms and depressive symptoms. Though this study did not attempt to predict depression's influence on health, these findings provide support for the common association between IPV, health and depression. Findings indicate that women

with recent physical and sexual IPV were 2.8 times more likely to report poor health and significantly more likely to experience significant depressive symptoms compared to those with no IPV. Humphrey et al. (2009) conducted a study on a community sample of 346 diverse women aimed at understanding the relationship between interpersonal violence, chronic health problems and depression while controlling for ethnicity and socioeconomic status (SES). Regardless of SES and ethnicity, IPV was highly correlated with both chronic health problems and frequency and severity of depression. While few studies have examined whether depression predicts physical health in an IPV sample, other studies have reported associations between depression and health in other populations. A longitudinal study of spouses caring for a spouse with Alzheimer's disease, Pruchno, Kleban, Michaels and Dempsey (1990) found that depressive symptoms of family caregivers were related to poor health outcomes measured six months later.

Pruchno et al. (1990) proposed that high levels of depression resulted in increased susceptibility to illness because of various corresponding behaviors that occur with depressive symptoms including getting less sleep, eating less, and other behaviors that are related to poor health. In addition to poor self-care, some have suggested that depression might influence health through an association with chronic pain. Koopman (2007) examined the relationship between depressive symptoms, child and adult abuse, and bodily pain in a sample of women with a history of IPV (the majority of women had left the relationship 4.7 years earlier). Results showed that women who experienced more depression symptoms also experienced greater bodily pain. While these findings provide

support for a significant relationship between depression and chronic pain, since reported retrospectively, we cannot determine the directionality of the relationship or long-term impact of depression on levels of physical health. Other research has also provided support for the association between depression and chronic pain. For example, Fishbain et al. (1997) found that chronic pain sufferers were more likely to experience depression than non-pain sufferers while Ohayon and Schatzberg (2003) report findings indicating that a chronically painful episode increases the period of depressed mood. While these findings did not evaluate chronic pain in an IPV sample, these findings suggest that depression might be associated with chronic pain, though the directionality of that association is unclear. The current literature regarding depression and health in IPV samples lacks longitudinal research to examine the long-term reciprocal relationship between depression and health (Bonomi et al. 2006, Koopman, 2007; Humphrey, 2009).

### **Comorbidity and Physical Health**

High levels of comorbidity between PTSD and depression are common in studies of various traumatized groups ((IPV) Cascardi et. al., 1999; (IPV) Stein & Kennedy, 2001; (combat) Shalev et al., 1998; (disaster) Green and Lindy, 1994). Using a sample of women with IPV, Nixon, Resick and Nishith (2004) reported that 21% (out of 135 participants) had no depression or PTSD, 28% had PTSD alone, and 51% had both PTSD and depression. Some estimate comorbidity rates in men and women at nearly 50% (Kessler et al., 1995). These findings suggest that comorbidity rates in traumatized samples as a whole, as well as IPV samples, are high.

PTSD patients with comorbid depression report more negative health perceptions and more somatization as compared to those without comorbidity (Clum et al., 2000). Schnurr and Green (2004) suggest that both PTSD and depression have unique and significant contributions to negative health outcomes. In a large study of 2718 older adults (both veterans and non-veterans), Rauch et al. (2006) found that having both higher depression and PTSD symptoms significantly contributed to more negative health perceptions. Rauch et al., (2010) examined PTSD and depression symptoms in a sample of 249 veterans to examine how each differentially impact health satisfaction. Results showed that when both PTSD and depression were included together in a model predicting health satisfaction, depression accounted for a significant portion of variance (10%). Calhoun et al. (2009) examined whether the relationship between PTSD and health could be accounted for by depression symptoms in a sample of community and military women. The four comparison groups included women with PTSD alone, women with PTSD and MDD, women with MDD alone, and women with neither diagnosis. Women were compared with regards to their current health complaints, past physical conditions and lifetime physical conditions. Results generally showed a unique relationship between PTSD and physical health. Women with PTSD, with and without MDD, reported more current health complaints, self-reported lifetime health problems, and past year medical issues when compared to women without PTSD or MDD. However, some research suggests that the symptom overlap between PTSD and depression casts doubt upon whether these are different disorders in the aftermath of a traumatic experience. Stein and Kennedy (2000) examined comorbidity between PTSD and MDD in a sample of 44 women who experienced IPV within the past 2 years.

Findings indicate that in nearly all cases (75%), current major depression occurred in the context of IPV-related PTSD. Further, results suggest that MDD following IPV occurred primarily in those women who were also experiencing IPV-related PTSD, thus raising questions about whether these diagnoses perhaps relate to underlying distress as opposed to distinct outcomes of trauma.

So, while current research suggests that comorbid depression and PTSD can have an increasingly negative health impact, less is understood about the *independent effects* of depression and PTSD on health. For example, of those studies that specifically examined the impact of PTSD on health outcomes in IPV samples, several have neglected to account for co-occurring levels of depression (Kaysen, et al., 2004; Laffaye & Kennedy, 2003; Wuest, 2009). Thus, it is possible that our understanding of PTSD's specific impact of health is partially influenced by depression symptoms, or general distress levels. While both PTSD and depression are linked to IPV and health outcomes, less research has focused on the unique health impacts of PTSD and depression, or on their comorbid effects in the context of IPV.

### **Reciprocal Relationships:**

#### **Physical Health, PTSD and Depression**

One of the problems with cross-sectional research is the issue of temporal sequence. When PTSD correlates with health, it remains unclear whether changes in PTSD precede changes in health or whether changes in health exacerbate mental health symptoms. Currently, the cross-sectional data on PTSD and physical health is ambiguous in terms of antecedent effects. So, it is important to use longitudinal data to study the

reciprocal relationships between mental health (PTSD and depression) and physical health symptoms. It is certainly possible that illness and pain influence the experience of PTSD symptoms. While we aim to contribute to the IPV literature by further understanding how PTSD and depression symptoms impact physical health over the short (4-6 months) and long-term (1.5 years), we also plan to evaluate whether there is a reciprocal relationship between mental and physical health. In other words, we suggest that understanding how PTSD and depression impact future health is as important as understanding whether physical health predicts future PTSD and depression symptoms.

It is important to consider that the physical discomfort related to health issues might be particularly salient for women with IPV. Because IPV often entails physical violence, these women might be more in tune to somatic discomfort and cues, which might therefore activate conditioned responses to bodily sensations, including shame, anger, or sadness. Thus, physical health symptoms might serve as an emotional trigger for specific PTSD symptoms such as arousal, avoidance or re-experiencing symptoms.

In addition, an increase in health problems might impact level of anxiety and depression due to related stressors involved in health care. These stressors might include worry about symptoms and overall health, financial investment required to receive medical attention and doctors visits that might necessitate taking days off work. Particularly for low-income populations, health utilization may present significant challenges and stressors, which could in turn impact mental health.

Research suggests that physical health symptoms can have a significant impact and influence on mental health (Killian, et al., 2005; Aneshensel et al., 1984). Some research has focused specifically on the relationship between PTSD and chronic pain and

found that there might be some bi-directionality within this relationship. Sharp and Harvey (2001) proposed the “mutual maintenance model” which incorporates several cognitive, affective and behavioral mechanisms that may maintain PTSD and chronic pain. This model suggests that PTSD patients interpret chronic pain as a constant reminder of the traumatic event. Liedl (2009) commented on Sharp and Harvey’s model and acknowledged that a possible mechanism underpinning the maintenance of both PTSD and chronic pain is that pain becomes the trigger for distressing trauma memories thus enacting cluster symptoms of PTSD such as avoidance and arousal symptoms. The research remains mixed in terms of directionality with some illustrating that PTSD predicts chronic pain (Sharp & Harvey, 2001) and others showing that chronic pain predicts PTSD symptoms (Liedl, 2009).

While we are unaware of literature pertaining to trauma that has assessed the reciprocal relationship between depression and health, there is some research to support bi-directionality between depression and physical health symptoms including chronic pain (Koopman, 2007; Ohayon & Schatzberg, 2003). Aneshensel, Frerichs, and Huba (1984) interviewed 451 randomly sampled females and 293 males and assessed physical health and illness and depressive symptoms over the course of 1 year (including 4 follow-up interviews). Results indicate that while physical health had a large effect on depressive symptoms, depressive symptoms had a small but still significant 4-month lagged effect on physical health. More recently Killian et al., (2005) examined a population of caregiving women in mid-life (ages 51-61) and found support for a reciprocal relationship between health and depressive symptoms. Killian and colleagues suggest that the findings also imply that increased physical symptoms may result in a “positive

feedback loop characterized by a decline in psychological well-being contributing to a greater decline in physical health followed by an additional decline in psychological well-being (page 118).” Understanding whether this cycle pertains to depression in an IPV sample would contribute to the current literature.

### **Confounds in the Relationship Between PTSD, Depression and Health**

There have been many attempts to further clarify the relationships between physical health, PTSD, and depression and we have identified several confounds throughout the IPV literature that could potentially impact our understanding of these relationships. We plan to control for the role of other predictors of health risk such as severity of violence, influence of prior childhood trauma (physical and sexual abuse), and substance abuse.

The role of injury is of specific significance in the context of intimate partner violence with an estimated 2 million injuries occurring each year and 40-60% of abused women sustaining injuries to the head, neck and face (CDC, 2003). The association between PTSD and health could be partially explained by severity of violence; In other words, PTSD and health problems are both more likely with increased severity of violence partially due to higher likelihood of injury. Wuest et al. (2009) examined a sample of 309 IPV survivors and found that PTSD was related to physical health largely thru its association with chronic pain resultant from injury from abuse. However, there have been some mixed findings when exploring the role of injury in the relationship between PTSD and physical health. Sutherland, et al. (1998) found that depression and

anxiety, not injury, influenced physical health outcomes, while Sutherland et al. (2002) found a small mediating effect for recent injury.

Research suggests that women who experienced child abuse are between 2 and 10 times more likely to experience IPV than women who were not abused during childhood (Messman-Moore & Long, 2001). Silva et al. (1997) reported that within a sample of battered women, 53% women reported a history of physical and/or sexual abuse during childhood. These high numbers of women with both child and adult abuse have led some to propose that the cumulative impact of multiple traumas over time could account for some of the relationship between IPV, PTSD and physical health (Campbell, et. al., 2008). Although experiencing one form of violence can have a significant impact on women's health (Campbell, 2002), it appears that the mental health consequences become more severe for women who have experienced multiple forms of violence (Campbell, et al., 2008). For example, women with histories of childhood sexual abuse who also experience IPV in adulthood have elevated levels of PTSD and depression in comparison to women who have experienced only one form of violence (Astin et al., 1995). Messman-Moore and Long (2001) examined a sample of undergraduate women regarding the influence of cumulative trauma (e.g. child abuse and IPV) and found that child abuse combined with IPV predicted increased PTSD symptoms. Lang et al. (2008) examined childhood maltreatment, PTSD and health outcomes in a sample of female veterans. Results indicate that PTSD mediates the impact of childhood maltreatment and fully mediated the effect of adult sexual assault on health functioning. Therefore, in an effort to isolate the impact of PTSD and depression on physical health consequences, we

plan to control for the potential cumulative effect of prior trauma, specifically, physical and sexual childhood abuse.

The prevalence of alcohol and drug use is high among battered women (Campbell, 2002; Golding, 1999) and even higher among shelter samples (Golding, 1999). In a population-based study, substance use was found to be a risk factor for PTSD and re-occurring violence and possible outcome of childhood trauma (Campbell, 2002). Literature on the use and abuse of substances by women in abusive relationships shows that these women report high rates of alcohol and drug use including illicit drug and tranquilizer use (Campbell et al., 1992). Research indicates that the substance abuse is often associated with increased risk for chronic health consequences such as injuries, cancer, and heart disease (Rehm et al., 2003; Rehm & Monteiro, 2005). Since the associations between substance abuse and trauma and substance abuse and physical health are well established, we included a measure of substance abuse in order to control for its influence.

### **Present Study and Hypotheses**

In this study, we examined associations between PTSD, depression and physical health among a sample of help-seeking women with IPV and explored cross-sectional, short and long-term reciprocal relationships over the course of 4-6 months and 1.5 years. Where necessary, we also controlled for the influence of substance abuse, childhood abuse, and severity of abuse as these typically pertain to women with IPV.

We hypothesized that both PTSD and depression symptoms would be associated with physical health at the initial assessment. We predicted that 1) PTSD and depression,

when entered alone, would both be associated with physical health; 2) PTSD would remain associated with physical health when controlling for depression effects; 3) These associations would remain despite controlling for substance abuse, childhood violence, and severity of violence.

We also conducted both short (4-6 months) and long-term (1.5 years) prospective analyses and hypothesized that in both analyses 1) PTSD and depression, when entered alone, would both be associated physical health; 2) PTSD would remain associated with physical health when controlling for depression effects; 3) These associations would remain despite controlling for substance abuse, childhood violence, and severity of violence; 4) Physical health would be associated with both future PTSD and depression symptoms despite controlling for prior mental health symptoms.

## CHAPTER 2

### METHODS

#### **Participants**

This study is part of a larger study that recruited a total of 406 participants from three community agencies as part of a longitudinal study on battered women's experiences (Goodman, Dutton, Weinfurt, & Cook, 2003). All participants were seeking services related to IPV resulting from a current or former male partner. The three recruitment sites included a domestic violence criminal court ( $n = 118$ , 29.1%), a civil protection order intake office ( $n = 220$ , 54.2%), and a battered women's shelter ( $n = 68$ , 16.7%). Participants were eligible to participate if they were at least 18 years of age, had sought help from one of the sites as a means of dealing with intimate partner violence perpetrated by a current or former intimate partner(s) (designated as the "index partner"), spoke English, and had access to a telephone. Women were not eligible to participate if they appeared intoxicated or appeared to have significantly impaired mental status (e.g., delusional, psychotic, paranoid) at the time of screening, as determined through initial face-to-face contact. The current sample included 249 participants amounting to 61% of the original sample ( $n=406$ ). This sample included only women who completed at least two of the three interviews that occurred at the 6<sup>th</sup> (T6), 7<sup>th</sup> (T7) and 8<sup>th</sup> (T8) time point (see Table 1).

Table 1

*Assessment Time Frame: Current Study*

Interview	Timeframe
T6	2 years after Time 1 (baseline)
T7	1 year after Time 6
T8	1 year and 4-6 months after Time 6; 4-6 months after T7

This study exclusively focused upon participants who completed these time points because the 6<sup>th</sup> assessment is the first assessment period in which physical health information was systematically assessed. Of the women in the current sample, 59.4% were recruited from a civil protection order intake office (n=148), 26.5% were recruited from a domestic violence criminal court (n=66) and 14.1% were recruited from a battered women's shelter (n=35).

Participants ranged in age from 17 to 57 ( $M = 33.2$ ,  $SD = 8.5$ ) and were significantly older than those participants without T6, T7 and T8 data ( $M = 31.3$ ,  $SD = 8.8$ ). In the current sample, 80.3% identified as African American and 50.4 % of women were employed full-time and were more likely to be employed than non-completers. Women in the current sample were also likely to have more education and lower levels of partner violence at baseline (T1). There were no differences in ethnicity

or income between participants in the current sample and those without a T6, T7 and T8 interview (see Table 2).

Table 2

*Characteristics of Women with Intimate Partner Violence: Comparison of Current Sample and Original Sample*

Characteristic	Non-completers N=157	Completers N=249
Age (%)		
17-24	23.7	21.9
25-34	43.0	34.0
35-44	28.8	35.2
45-54	3.1	8.1
55-65	1.4	0.8
Age (mean)	31.3*	33.2*
Household Income (%)		
<\$25,000 and below	85.6	87.1
>\$25,000 and above	14.4	12.9
Employment (%)		
Part-time	9.6	12.9
Full-time	43.3	50.4
Unemployed	45.9*	36.7*
Education (%)		
8-11 <sup>th</sup> grade	33.3*	23.0*
High school graduate	28.2	29.0
Trade school	7.7	6.9
Some college	25.7	30.6
College degree	3.8	7.7
Graduate school	1.3	2.8
Race/Ethnicity (%)		
African American	79.0	80.3
White	12.1	13.3
Latina	1.9	0.8
Asian	0.6	0.8
Multi-racial/other	3.8	3.6
Any violence before 16 (%)	49.0	55.4
Sexual abuse	5.1	14.1
Physical abuse	15.9	18.9
Both	28.0	22.5
Previous IPV (%)	43.9	45.0

Characteristic	Non-completers N=157	Completers N=249
T1 PCL (mean)	49.3	47.4
T1 CES-D (mean)	30.7	29.1
T1 CTS total endorsed (%)	45.8*	40.0*
T1 CTS severe abuse (%)	4.40	3.85
T1 Substance abuse (mean)	4.68	4.34

\* $p < .05$

### Procedures

Potential adult female participants were recruited from one of three Washington DC sites offering services to battered women. Women were approached by trained law students at each of the recruitment sites. Law student recruiters were trained by a clinical psychologist in interviewing techniques. The recruitment, screening, and baseline procedures took approximately 45 to 60 minutes. Originally, participants were asked if they were interested in participating in a longitudinal study in which they would be paid for five interviews over the course of approximately one year. However, the study was extended past the initial one-year period for a total of four-and-a-half-years. Individuals who expressed interest were asked screening questions to determine eligibility according to the inclusion criteria. Following the establishment of eligibility, prospective participants were invited to participate and asked to sign a written informed consent. Women who agreed to participate and signed the informed consent were administered the initial (on-site) baseline interview. If participants were unable to complete the interview in-person, women could take the questionnaire used during the interview home with them and mail it back to the researchers. These interviews assessed demographics, recent

violence and symptomatology as well as a variety of other variables. Most women approached ( $N = 739$ ) who were eligible to participate in the study agreed to do so. The overall refusal rate in the study among women that we attempted to recruit was 28.6%. The primary reason given by women who refused to participate was related to time constraints.

Following the administration of the interview, participants were debriefed and asked about any adverse effects they experienced as a result of the interview. Women were offered follow-up referral information for community resources, such as hotline numbers, temporary housing, and legal aid. They were also reminded about follow-up interview procedures and asked for phone number(s) where they could be reached as well as the names and phone numbers of individuals who would likely know how to contact the participant (if the primary numbers were no longer correct).

Participants were later contacted by trained clinical psychology graduate students for follow-up telephone interviews that lasted approximately 45 to 60 minutes. Female graduate students in psychology were trained as research assistants to administer comprehensive interviews to participants over the phone. Interviewers read items to participants and recorded information during the interview on standardized interview forms. Informed consent was obtained and safety was ensured prior to interview administration at each time period. The entire larger study was completed over approximately 4.5 years between 1999 and 2004 during which 10 interviews were completed. Participants earned \$20 for completing each interview and \$50 for completing the final interview. T6 was completed approximately 2 years following the initial

interview (T1). T7 was completed approximately 1 year following T6 and T8 occurred approximately 4-6 months following T7.

## **Measures**

### **Demographics**

Participants were asked to report on demographics during each interview. These variables related to age, ethnicity, employment status, income, and number of children.

### **Depression**

Depression was assessed with the Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977), which is a 20-item self-report measure of current depression symptomatology. Respondents are asked to report the degree to which they experienced each of the depressive symptoms over the week prior to the interview, and the total score reflects severity of depression. Participants responded to CES-D items on a scale of 0-3 (0 – “rarely,” 1 – “some of the time,” 2 – “occasionally,” and 3 – “most of the time”), and a total score ranges from 0-60. A cutoff score of 16 has been recommended to discriminate a depression diagnosis (Weissman et. al., 1977; Boyd, et. al., 1982). This scale has been used frequently with community samples of low-income and battered women (Dutton, 1998; Sullivan & Bybee, 1999). Preliminary research with low-income, urban battered women in the court system found Cronbach’s alpha to be .91 (Dutton, 1998; Goodman, Bennett, & Dutton, 1999). The CES-D was completed at each data collection.

### **Posttraumatic Stress Disorder**

PTSD was assessed using the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska & Keane, 1993). The PCL is a 17-item measure that asks participants to indicate on a 4-point scale the degree of distress experienced over the past month relating to specific PTSD symptoms. Participants responded to PCL items on a scale of 1-5 (1 – “not at all,” 2 – “slightly,” 3 – “some,” 4 – “very,” and 5 – “extremely”), and responses were summed across all 17 items to create a total score from 0 – 85. Scores on the PCL range from 17 to 85, with a clinical cutoff of 50 indicating a probable PTSD diagnosis (Weathers, Litz, Herman, Huska, & Keane, 1993) with more liberal cut-offs ranging around 35. The PCL includes three subscales that correspond to the intrusion, avoidance, and hyper-arousal clusters and the PCL scoring method uses these three subscales to identify probable PTSD cases (a rating of 3 or above on a 5-point scale is considered a symptom). Possible DSM-IV-TR diagnosis can be assessed using the PCL and the following criteria: 1 or more intrusion symptom, 3 or more avoidance/numbing symptoms, and 2 or more hyper-arousal symptoms (Diagnostic & Statistical Manual-TR, 2000). The PCL was specifically completed in relation to participants’ experiences with domestic violence. The PCL has demonstrated strong internal consistency, test-retest reliability, convergent and divergent validity, and diagnostic ability across a variety of populations (Blanchard, Jones-Alexander, Buckley & Forneris, 1996; Mueser et al., 2001). One analysis involving low-income African American battered women found a Cronbach’s alpha of .94 (Dutton, 1998; Goodman, Bennett & Dutton, 1999). The PCL was completed at all time points.

### **Intimate Partner Violence**

We used the yes/no version of the Conflict Tactics Scale-2 (CTS-2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996), a 22-item scale designed to measure physical and sexual violence. This measure indexes specific abusive behaviors during a particular time frame. At time one, participants were asked about the occurrence of these behaviors in the past year, and at each follow-up period with respect to the past three months. This measure includes three subscales: physical abuse, injury, and sexual abuse. The sexual abuse subscale was modified in order to broaden criteria so that sexual acts done by the woman to prevent future violence were captured. This modification entailed removing items that referred to the perpetrator “insisting” on sex without the use of force or threats and by adding “I had sex with him because I was afraid of what he would do if I didn’t.” These modifications changed this subscale from seven to four items. At each time point, responses were summed for all items (yes: 1, no: 0) with respect to the period of time following the most recent assessment.. At each time point, the CTS severity score represented a sum score of severe forms of violence that occurred since the last interview. Severe items included “Choked or strangled you,” “Punched or kicked you,” “Beat you up,” and sexual violence items. The total CTS score served as a measure of the total CTS items endorsed since the last assessment. This score included severe and less-severe forms of violence including “Grabbed you,” and “Pushed or shoved you.” The CTS-2 is one of the most commonly used measures of violence in IPV research (Newton, Connelly & Landsverk, 2001). The CTS-2 has good reliability and construct validity (Straus, Hamby, Boney-McCoy & Sugarman, 1996) and in a recent study, Cronbach alpha

coefficients using the CTS-2 for low-income, primarily African American women was between .75 for the injury subscale and .90 for the physical assault subscale (Goodman et al., 1999). The CTS was administered at each assessment period.

### **Childhood Sexual and Physical Violence**

Childhood sexual and physical abuse was measured using six items drawn from the Stressful Life Events Screening Questionnaire (SLESQ; Goodman, Corcoran, Turner, Yuan, & Green, 1998). To determine physical abuse, participants were asked whether the following had occurred prior to the age of 16: (a) been slapped repeatedly (b) beaten (c) attacked or otherwise harmed. To determine sexual abuse, participants were asked about whether the following had occurred prior to age of 16: (a) rape, (b) attempted rape, and (c) molestation. Response options were yes or no. For the present study, a participant was treated as having a sexual or physical abuse history if they reported yes to any one of the items. The childhood violence item served as an indicator of whether any violence (sexual and/or physical) had occurred prior to age of 16. Childhood violence was assessed at the initial assessment period (T1).

### **Substance Abuse**

Participants were assessed on several dimensions of alcohol and drug use at each assessment period. Questions include “Since the last assessment, how often did you drink alcohol,” “How often you were you intoxicated,” and “How often did you use street drugs.” Participants responded to items on a scale of 1-5 (1 – “not at all,” 2 – “1-2 times”

3 – “3-10 times,” 4 – “11-20 times,” and 5 – “almost daily”). Responses were summed across these 3 items to create a total score from 3 – 15.

### **Physical Health**

Health was assessed using the SF-36 (Short Form 36 Health Survey; Ware et al., 1993), a 36-item questionnaire that consists of 4 scales that reflect physical health (physical functioning, physical role-functioning, pain, and general health perception) and 4 scales that reflect mental health (social functioning, vitality, emotional role functioning, and mental health). The SF-36 is a self-report measure that assesses a wide range of health states. It has been found to be a reliable and valid measure of physical and mental health-related quality of life (McHorney, Ware & Raczek, 1993). Scores of each subscales range from 0-100 with lower scores indicating worse health functioning. A mental health (MHC) and physical health component (PCS) score can be derived from the SF-36 (Ware et. al., 1995) and have been found to capture more than 80% of variance in subscales making each component score a valid index of overall physical and mental health (Ware et. al., 2001). For this study, we utilized the subscales that represent the strictest measures of physical health and were least likely to be confounded with aspects of mental health. These subscales include the overall PCS, and the physical functioning and pain subscales. The PCS is considered a highly valid indicator of physical health that has been suggested to have a reduced influence of mental health status on the reporting of physical health status (Ware et. al., 1994). The physical functioning subscale is considered the strictest physical health measure as it assesses specific aspects related to physical functioning (Ware & Kosinski, 2001). Summary scores for PCS and subscales

are standardized to responses from the US general population (Ware, Kosinski & Keller, 1994) and component scores are transformed to a mean of 50 and standard deviation of 10. Ware, Kosinski, and Keller (1994) present the following means and standard deviations gathered from the general U.S. population: physical functioning (M=84.2, SD= 23.2), bodily pain (M=75.2, SD=23.7), and PCS (M=50, SD=10). More than 25 studies have published reliability statistics that exceed 0.70 (Tsai, Bayliss & Ware, 1997) and the majority have exceeded 0.80 (Ware et al., 1993). Reliability estimates for the PCS is typically greater than 0.90 (Ware et al., 1994).

## CHAPTER 3

### RESULTS

#### Descriptives

Table 3 presents the descriptive statistics summarizing means and standard deviations of participants' reports of mental and physical health symptoms.

Table 3

*Means and Standard Deviations*

	Time 6		Time 7		Time 8	
	M	SD	M	SD	M	SD
PCL	32.1	15.5	32.4	15.7	29.1	14.0
CES-D	17.4	12.4	18.1	12.4	16.7	11.7
Substance abuse	4.4	2.0	4.0	1.5	4.1	1.5
Physical component	51.3	11.2	50.6	10.1	53.3	12.0
Physical functioning	82.7	23.2	81.3	25.6	82.8	23.0
Pain	75.0	32.2	75.3	31.8	72.8	34.1

At T1, all 249 women had experienced some form of violence within the last 3 months. For 34.5% of participants, this reported violence represented the first act of violence within the relationship. The majority of women (96.8%) reported between one

and 10 violent acts at T1. At T6 (which occurred 2 years following T1 and 1 year following the most recent assessment), the majority of participants (74.7%) reported no instances of violence since the prior assessment and 12% reported some acts of violence since T5. At T7, the majority of participants (77.5%) endorsed no instances of violence and 13.3% reported some instances of violence. At T8, the majority of participants (78.1%) endorsed no instances of violence and 22% reported some instances of violence. At T1, 69.1% of women met criteria for a PTSD diagnosis using the recommended PCL cutoff indicative of probable PTSD diagnosis (Weathers, Litz, Herman, Huska & Keane, 1993). At T6, approximately 14.5 % of participants met criteria for a PTSD diagnosis, at T7, 14.1% of participants met criteria, and at T8, 10.3% met criteria. Women who met criteria for PTSD also reported significantly lower physical health scores (PCS, physical functioning and pain). At T1, 84.1% of the current sample met criteria for depression using the recommended cutoff score of 16 (Weissman, et al., 1977; Boyd et al., 1982). At T6, 47 % of women met criteria for depression, at T7, 47.8% of women met criteria and T8, 48.6% met criteria. These women also reported significantly lower scores on physical health.

### **Statistical Analyses**

To investigate the relationship between symptoms of PTSD and depression and physical health we conducted five sets of analyses: a) cross-sectional regression analysis of the relationship between PTSD, depression symptoms and physical health; b) longitudinal analysis assessing how PTSD and depression symptoms predict change in physical health symptoms 4-6 months later; c) longitudinal analysis assessing how PTSD

and depression symptoms predict change physical health symptoms 1.5 years later; d) longitudinal analysis aimed at understanding the role of physical health in predicting future PTSD symptoms 4-6 months and 1.5 years later; and, d) longitudinal analysis aimed at understanding the role of physical health in predicting future depression symptoms 4-6 months and 1.5 years later. In all of these analyses, we controlled for severity of violence, child abuse, substance abuse and prior physical and mental health status when necessary. We assessed the necessity of including controls by examining the correlation matrix. If variables were not correlated with outcomes of interest, we excluded them from analyses in an effort to minimize using unnecessary degrees of freedom. We used T7 to predict T8 (short-term analysis) and T6 to predict T8 (long-term analysis). Typically, prospective analyses of short and long-term effects would structure the analyses so that the first time point (in this case T6) is used to predict a short-term outcome and a longer-term outcome. This strategy made less sense in this case. The time between T6 and T7 is one year, whereas the time between T7 and T8 is 4-16 months. So the “short term” analyses (T6 predicting T7) would be one year, and the “long term” analyses (T6 predicting T8) would be a year and 4-6 months. The difference between a year and a year and a half seemed an odd choice for long vs. short-term comparisons. For this reason, we used T8, the outcome, as the anchor point, where we used T7 to predict T8 (short term: 4-6 months) and T6 to predict T8 (long term: 1.5 years).

It is also noteworthy that we performed all of these analyses twice, the first using the original complete data set (with participants who had completed all three assessments;  $n=135$ ) and the second with a larger dataset that included women who were missing one of the three required assessments (current sample;  $n=249$ ). To address missing data in this

larger dataset, we used multiple imputation to impute missing values for participants using variables in the original regression. As the results for both analyses were very similar and the differences were negligible, we will report only the results acquired using the larger dataset of women who had at least two of the three assessments.

### Cross-sectional Analyses of PTSD, Depression, and Physical Health

Correlational analyses were conducted to examine the simple bivariate relationships between mental and physical health variables, as well as the control variables (substance use, severity of violence, and childhood trauma). These correlations are listed in Table 4.

Table 4

*T6 Correlations: PTSD and Depression Symptoms, Health Subscales, Severity of Violence, Childhood Violence, and Substance Abuse*

	PCL	CES-D	CTS-2	Child Violence	Substance Abuse
PCL	-	.71**	.26**	.07	.36**
CES-D	-	-	.25**	.08	.34**
CTS-2	-	-	-	-.10	.22**
Child Violence	-	-	-	-	.12
Physical Component	-.19*	-.14	-.06	-.12	-.09
Physical Functioning	-.26**	-.19**	-.12	-.14*	-.13*
Pain	-.46**	-.41**	-.10	.12	-.81**

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

As expected, PTSD and depression symptoms were positively associated. Both PTSD and depression symptoms were negatively associated with physical health symptoms as measured by the three physical SF-36 scales. Violence severity was positively associated with PTSD and depression symptoms. Notably, there were no associations between violence and physical health subscales indicating there was no need to include it as a control variable. Child abuse was negatively associated with physical functioning. Substance abuse was positively associated with mental health symptoms and violence severity and negatively associated with the physical functioning and pain subscale.

Next, we conducted a regression analyses to assess the relationship between physical health subscales and mental health symptoms (see Table 5).

Table 5

*Linear Regression: Concurrent Analyses at T6*

	R <sup>2</sup>	Beta	T	P
SF-36: Physical Component				
Model 1	.037			-
PCL		-.193	-3.09	**
Model 2	.019			-
CES-D		-.139	-2.20	*
Model 3	.037			-
PCL		-.192	-2.15	*
CES-D		.002	-.017	-

	R <sup>2</sup>	Beta	T	P
SF-36: Physical Functioning <sup>a</sup>				
Model 1 <sup>b</sup>	.082			***
PCL		-.238	-3.62	***
Model 2 <sup>c</sup>	.057			**
CES-D		-.170	-2.51	*
Model 3 <sup>d</sup>	.082			***
PCL		-.238	-3.62	***
CES-D		-.228	-.176	-
SF-36: Pain <sup>e</sup>				
Model 1	.210			***
PCL		-.464	-7.71	***
Model 2	.167			***
CES-D		-.420	-6.61	***
Model 3	.226			***
PCL		-.348	-4.30	***
CES-D		-.184	-2.24	*

<sup>a</sup> Child abuse and substance abuse were controlled for.

<sup>b</sup> Child abuse ( $\beta = -.122$ ;  $p = .049$ )

<sup>c</sup> Child abuse ( $\beta = -.124$ ;  $p = .048$ )

<sup>d</sup> Child abuse ( $\beta = -.122$ ;  $p = .049$ )

<sup>e</sup> Substance abuse was controlled for.

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

For each physical health subscale, we first examined the impact of PTSD symptoms alone, then depression symptoms alone and lastly, we included both PTSD and depression symptoms to investigate their unique effects on health. As predicted, PTSD symptoms alone were negatively related to the PCS. Depression was also negatively associated with the PCS. When both PTSD and depression were entered into the regression, only PTSD symptoms were negatively associated with the physical component score. As shown in Table 5, we also conducted analyses with the specific subscales as outcomes. PTSD symptoms were negatively associated with the physical health functioning subscale when entered alone. Depression symptoms were also negatively associated with physical functioning when entered alone. When both PTSD and depression symptoms were entered into the regression equation only PTSD symptoms were negatively associated with the physical functioning score ( $p < .005$ ).

For the pain subscale, there was a significant negative association between PTSD and pain as well as with depression and health when each were entered alone. When PTSD and depression were entered together, both PTSD and depression remained negatively associated with pain indicating that both contribute to the experience of bodily pain.

Overall, these results suggest a specific association between PTSD and overall physical functioning despite controlling for health, though both depression and PTSD appear to independently relate to levels of pain.

### **Longitudinal Analyses:**

#### **Influence of Mental Health on Physical Health:**

##### **Short-Term Analyses (4-6 Months)**

Multiple regression analyses were used to test whether PTSD and depression symptoms were prospective predictors of changes in physical health (T7 predicting T8). Several models were run for each specific physical health subscale of the SF-36 to assess separate influence of PTSD and depression symptoms as well as the combined influence. In addition, we controlled for the corresponding T7 health subscale across all analyses. Results are listed in Table 6. Results indicate that the PCS, a good measure of overall physical health on the SF-36, is negatively associated with both depression and PTSD when both were entered simultaneously into the equation, indicating that symptoms specific to depression may drive the negative health outcomes associated with trauma. A similar pattern arose when we examined the pain subscale as an outcome. Both PTSD and depression symptoms were significant when entered alone though only depression remained a significant predictor when depression and PTSD were entered simultaneously. Results were different in analyses with physical functioning as an outcome. While both PTSD and depression symptoms were significant when each were entered alone, neither were significant when entered together. While these prospective findings for physical functioning suggest that associations between PTSD and depression symptoms and health might be driven by an underlying shared variance (e.g. distress), findings for the PCS and pain suggest that the mechanisms driving the association between mental and physical health are more closely related to depression. In addition, as suspected, prior health was positively associated with future health across all analyses.

Overall, these results suggest that while both PTSD and depression are associated with physical health, depression may uniquely impact health outcomes. While the general distress shared by PTSD and depression appeared associated with physical functioning, the other findings point more specifically to depression symptoms.

Table 6

*Linear Regression: Longitudinal Analyses (Short Term)*

	$R^2$	Beta	T	P
SF-36: Physical Component				
Model 1	.267			***
PCL		-.159	-2.87	**
Model 2	.280			***
CES-D		-.196	-3.56	***
Model 3	.281			***
PCL		-.053	-.732	-
CES-D		-.160	-2.19	*
SF-36: Physical Functioning <sup>f</sup>				
Model 1	.240			***
PCL		-.192	-3.26	***
Model 2	.235			***
CES-D		-.181	-3.01	**
Model 3	.245			***
PCL		-.132	-1.75	-
CES-D		-.097	-1.26	-
SF-36: Pain <sup>g</sup>				
Model 1	.199			***

	R <sup>2</sup>	Beta	T	P
PCL		-.174	-2.84	**
Model 2	.212			***
CES-D		-.218	-3.64	***
Model 3	.217			***
PCL		-.059	-.754	-
CES-D		-.182	-2.23	*

<sup>f</sup> Child abuse, substance abuse, and physical functioning at T7 were controlled for. Physical functioning was significant in all analyses ( $p=.000$ ).

<sup>g</sup> Substance abuse and pain at T7 was controlled for. Pain at T7 was significant in all analyses ( $p=.000$ ).

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

### Longitudinal Analyses:

#### Influence of Mental Health on Physical Health:

##### Long-term Analyses (1.5 years)

Multiple regression analyses were used to test whether PTSD and depression symptoms were prospective predictors of changes in physical health over a longer period of time - 1.5 years (T6 predicting T8). Several models were run for each specific physical health subscale of the SF-36 to assess separate influence of PTSD and depression symptoms as well as combined influence. In addition, we controlled for the corresponding T6 health subscale across all analyses. Results are listed in Table 7. Results indicate that for the PCS, depression is negatively associated with health when entered alone. PTSD is nearing significance ( $p=.083$ ) when entered alone. When both PTSD and depression were entered together, there were no significant findings, again

suggesting that any effects were driven by a shared variance. We also examined the physical health subscales as outcomes. For the physical functioning subscale, results indicate a similar pattern as reported in the short-term analyses. Both PTSD and depression were significant when entered alone though neither were significant when entered simultaneously, again that suggesting that the observed effects are driven by a shared underlying distress component. There were no significant associations between mental health and the pain subscale. In addition, as suspected, prior health was significantly positively associated with future health across all analyses. These results suggest an underlying pattern of general distress that is associated with changes in physical health.

Table 7

*Linear Regression: Longitudinal Analyses (Long Term)*

	R <sup>2</sup>	Beta	T	P
SF-36: Physical Component				
Model 1	.216			***
PCL		-.100	-1.74	-
Model 2	.224			***
CES-D		-.136	-2.41	*
Model 3	.224			***
PCL		-.005	-.068	-
CES-D		-.133	-1.65	-
SF-36: Physical Functioning <sup>h</sup>				
Model 1	.142			***

	R <sup>2</sup>	Beta	T	P
PCL		-.236	-3.62	***
Model 2 <sup>i</sup>	.138			***
CES-D		-.226	-3.44	***
Model 3 <sup>j</sup>	.150			***
PCL		-.155	-1.80	-
CES-D		-.123	-1.43	-
SF-36: Pain <sup>k</sup>				
Model 1	.203			***
PCL		-.014	-.200	-
Model 2	.206			***
CES-D		-.069	-1.02	-
Model 3	.207			***
PCL		-.043	-.509	-
CES-D		-.094	-1.12	-

<sup>h</sup> Child abuse, substance abuse, and physical functioning at T6 were controlled for. Physical functioning at T6 was significant in all analyses ( $p=.000$ ).

<sup>i</sup> Substance abuse is significant ( $\beta = .131$ ;  $p=.046$ ).

<sup>j</sup> Substance abuse is significant ( $\beta = .144$ ;  $p=.028$ ).

<sup>k</sup> Substance abuse and pain at T6 was controlled for. Pain at T6 was significant in all analyses ( $\beta=.416$ ;  $p=.000$ ).

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

### Reciprocal Effects:

#### Influence of Physical Health on Mental Health:

##### Short-term Analyses (4-6 months)

In order to test reciprocal effects, we examined additional models aimed at understanding the influence of physical health on changes in PTSD and depression symptoms. Results are listed in Tables 8 and 9. We ran similar models as before, but this time the PCS at T7 was used to predict mental health at T8, controlling for mental health at T7. Results indicate that the global PCS did not prospectively predict PTSD and depression 4-6 months later. We also examined the other physical health subscales as predictors of PTSD and depression. The physical functioning subscale was negatively associated with PTSD symptoms at 6-month follow-up. This finding indicates that individuals who endorsed more health concerns at T7 had a greater increase in PTSD symptoms at T8. However, it is noteworthy that this was the only subscale that predicted PTSD or depression, suggesting that health was not contributing much predictive power to change in PTSD and depression over a 6- month period.

Table 8

*Linear Regression: Reciprocal Relationships with Physical Health Predicting PTSD Symptoms (Short Term)<sup>1</sup>*

	Beta	T	P
Physical Component	-.046	-.921	-
Physical Functioning <sup>m</sup>	-.126	-2.49	*
Pain <sup>n</sup>	-.061	-1.172	-

<sup>l</sup> All analyses controlled for PTSD at T7. T7 PTSD was significant across all analyses ( $p=.000$ ).

<sup>m</sup> Child abuse and substance abuse were controlled for. Substance abuse was significant ( $\beta=.128$ ;  $p=.009$ ).

<sup>n</sup> Substance abuse was controlled for. Substance abuse was significant ( $\beta=.136$ ;  $p=.006$ ).

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Table 9

*Linear Regression: Reciprocal Relationships with Physical Health Predicting Depression Symptoms (Short Term)* <sup>o</sup>

	Beta	T	P
Physical Component	-.046	-.841	-
Physical Functioning <sup>p</sup>	-.052	-.937	-
Pain <sup>q</sup>	-.018	-.328	-

<sup>o</sup> All analyses controlled for depression at T7. Depression was significant in all analyses ( $p=.000$ ).

<sup>p</sup> Child abuse and substance abuse were controlled for. Substance abuse was significant ( $\beta=.227$   $p=.000$ ).

<sup>q</sup> Substance abuse was controlled for. Substance abuse was significant ( $\beta=.230$   $p=.000$ ).

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

### Reciprocal Effects:

#### Influence of Physical Health on Mental Health:

##### Long-term Analyses (1.5 years)

We also assessed whether physical health predicted PTSD and depression symptoms 1.5 years later. Results are listed in Tables 10 and 11. Results indicate that neither the PCS nor the physical functioning subscale predict PTSD and depression symptoms over the span of 1.5 years. However, results showed that pain was negatively associated with PTSD symptoms indicating that those who endorsed more pain at T6 had a greater increase in PTSD symptoms 1.5 years later.

Table 10

*Linear Regression: Reciprocal Relationships with Physical Health Predicting PTSD Symptoms (Long Term)<sup>r</sup>*

	Beta	T	P
Physical Component	-.084	-1.54	-
Physical Functioning <sup>s</sup>	-.080	-1.45	-
Pain <sup>t</sup>	-.193	-3.29	**

<sup>r</sup> All analyses controlled for PTSD at T7. PTSD was significant in all analyses ( $p=.000$ ).

<sup>s</sup> Child abuse and substance abuse were controlled for. Substance abuse was significant ( $\beta=.131$   $p=.023$ ).

<sup>t</sup> Substance abuse was controlled for. Substance abuse was significant ( $\beta=.113$   $p=.045$ ).

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

Table 11

*Linear Regression: Reciprocal Relationships with Physical Health Predicting Depression Symptoms (Long Term)*<sup>u</sup>

	Beta	T	P
Physical Component	-.029	-.498	-
Physical Functioning <sup>v</sup>	-.073	-1.23	-
Pain <sup>w</sup>	-.037	-.580	-

<sup>u</sup> All analyses controlled for depression at T6. Depression was significant in all analyses ( $p=.000$ ).

<sup>v</sup> Child abuse and substance abuse were controlled for.

<sup>w</sup> Substance abuse was controlled for.

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

## CHAPTER 4

### DISCUSSION

As hypothesized, our cross-sectional analyses are consistent with the previous literature (Laffaye et al., 2003; Zatzick et al., 1997; Malik et al., 1999) indicating that PTSD is associated with negative physical health outcomes. While our results show that depression symptoms are also associated with health, our cross-sectional analyses support previous research that indicates that PTSD is uniquely associated with negative health symptoms (Schnurr & Green, 2004; Green & Kimerling, 2004; Eby, 2004; Schnurr & Jankowski, 1999; Taft, Stern, King, & King, 1999; Wolfe, Schnurr, Brown & Furey, 1994; Taft et al., 1999; Zoellner et al., 2000; Wagner et al., 2002; Campbell et al., 2008; Taft et al., 2007). Our findings also suggest a combined impact of depression and PTSD on pain symptoms that is also consistent with previous literature (Ohayon & Schatzberg, 2003; Sharp & Harvey, 2001). There are several reasons why PTSD might uniquely contribute to adverse health outcomes. The chronic arousal responses associated with PTSD can have an adverse impact and wear on the immune system. Further, the misinterpretation of physiological arousal and panic may lead to worse health perceptions (Schnurr & Green, 2004; Weaver & Resnick, 2004). There is also evidence to suggest

that PTSD symptoms are associated with higher levels of somatization, leading to increases in health complaints (Pennebaker, 2000) as well as difficulty tolerating pain. In addition, PTSD may indirectly impact health through changes in health behaviors. There is evidence that increases in negative health behaviors, such as smoking, alcohol or drug use and decreases in exercise are associated with PTSD (Dobie, et al., 2004; Ullman & Brecklin, 2003).

These findings also suggest that the relationships between PTSD, depression, and health are not entirely artifacts of confounds such as substance abuse, violence severity, and child abuse (Astin et al. 1995; Campbell et al. 1997; Sutherland et. al., 2000). Even when relevant confounds were controlled, PTSD and depression still had predictive effects. However, we should note that there might be sample and measurement issues that explain why these confounds do not have a greater impact on our analyses. First, there were relatively low levels of substance abuse in our sample. We used a help-seeking sample of women that may have excluded women who were more likely to cope using negative health behaviors. Further, the brevity of our substance abuse measure (e.g. limited to three questions regarding use) may have reduced our ability to capture importance aspects of participants' substance use. In addition, our sample experienced relatively low levels of re-occurring violence, thus limiting our ability to generalize results to women experiencing ongoing violent relationships. We also utilized a global response (yes/no) to the occurrence of child abuse that neglected to account for multiple types (sexual vs. physical vs. both) and occurrences (e.g. number of instances and intensity of violence) of child abuse. There are certainly, then, caveats with respect to measurement and specific characteristics of this sample, but overall our findings do

suggest a relationship between PTSD and health that is independent of the typically noted confounds.

The six-month prospective analysis also supports previous literature, indicating that PTSD and depression both predict physical health (Schnurr & Green, 2004). However, more importantly, our results suggest that depression may uniquely impact health outcomes. While the general distress shared by PTSD and depression appeared associated with physical functioning, our other findings point more specifically to depression symptoms. Thus, our results do not support previous findings that specific symptoms related to PTSD symptomatology, such as hyper-arousal symptoms, may have an adverse health impact beyond the general distress component shared with depression. Further, our longitudinal findings stand in contrast to our cross-sectional findings. The prospective finding does provide support for the idea that the relationship between PTSD and health over time is largely driven by the distress component shared by PTSD and depression (Cascardi et al., 1999; Clum et al., 2000; Friendman & Schnurr, 1995) and perhaps, more specifically, related to depression symptoms. Previous research that has examined the impact of PTSD on health has frequently neglected to account for the effects of depression (Kimerling et al., 2000; Butterfield, et al., 2000) despite the fact that major depressive disorder often co-occurs with PTSD (Kessler et al., 1995). Our findings demonstrate the importance of recognizing the general distress that underlies both PTSD and depression, as well as perhaps the low positive affectivity that is more specifically related to depression, which can have a widespread impact on functioning. For example, depression might relate to heightened levels of arousal (e.g. feeling overwhelmed), as well as increased somatization leading to an increased focus on health symptoms as well

as decreased ability to tolerate pain. In addition, depression may lead to more negative health behaviors, such as smoking, alcohol and drug use, and decreased nutrition and exercise. Additionally, depression can often lead to increased isolation and social withdrawal, which have a known impact on overall wellbeing and perhaps, physical health (Killian, Turner & Cain; 2005)..

Results examining the impact of PTSD and depression on physical health one and a half years later again suggest an underlying pattern of general distress driving shifts in physical health. Findings indicate that the underlying distress present in both PTSD and depression might drive the adverse changes in physical functioning. However, it is noteworthy that while our results support several previous findings, our long-term findings suggest that the passage of time may have an impact on the strength of these relationships (Schnurr & Green, 2004; Schnurr et. al., 2007). Our results show that the majority of the findings reported in the six- month prospective analysis are reduced in significance and disappear in the one and a half year follow-up. These findings suggest that there is more to understand about the role of time in understanding the complex relationship between PTSD, depression and physical health. For example, while it is likely that mental health symptoms continue to have an impact on physical health, perhaps health outcomes are more or less impacted at different points in time. This relationship might depend on how long ago the most recent trauma occurred, the length of time one has experienced PTSD symptoms and/or the experience of particular PTSD symptom clusters (e.g. arousal). For example, perhaps distress, or more specifically, depression symptoms become more prominent and influential on physical health over time in women with chronic PTSD. We also propose that further research is needed to

understand the course of PTSD over time, whether depression is more influential over time depending on level of PTSD symptoms, how PTSD's course might influence physical health over short and long increments of time as well as the subtle mental and physical health symptom shifts that occur over time.

We found some preliminary evidence to support the idea of reciprocal relationships between physical health and PTSD. When health status was used to predict PTSD at six-months and one and a half year follow-ups, there were few associations. However, we did find physical functioning to predict PTSD symptoms at six-month follow-up (in support of some previous exploratory research by Schnurr and Green [2007]) and pain to predict PTSD symptoms at one and a half year follow-up. These findings suggest that physical symptoms may contribute to psychological changes, specifically PTSD symptoms. There were no other significant relationships between physical health subscales and subsequent PTSD or depression. There are several possible reasons for our limited findings. Perhaps there is a "physical symptom threshold" and mental health symptoms remain unaffected until a particular level of physical functioning impairment is reached. It is also possible that physical health impacts mental health in more indirect ways such as through loss of resources or unemployment and the impact may occur over a longer period of time. Overall, our longitudinal findings do shed some light on cross-sectional research and suggest that there are likely some reciprocal relations between PTSD, depression, and health. Further research regarding the impact of specific types of health issues and how these impact mental health symptoms in women with IPV and vice versa could help clarify our findings.

Overall, our cross-sectional findings suggest that women with PTSD are more

likely to report negative physical health symptoms. However, this association, whether assessed over a six month period or one and a half years, is more likely to be about general distress, and perhaps more specifically, depression symptoms, than specific symptoms related to PTSD. Our findings suggest that the experiential overlap across PTSD and depression, including negative emotionality, depressed mood, difficulty sleeping, difficulty concentrating, and disrupted interpersonal relationships, as well as unique aspects of depression, such as low positive affectivity, explain changes in physical health. It remains unclear which of these symptom clusters might drive the association with physical health, though it appears that symptoms more specifically related to depression are good candidates for future research. Overall, people who are more distressed and overwhelmed might not engage in as much self-care, which could lead to changes in health. In addition, as supported by the literature, both depression and PTSD have been associated with HPA-axis reactivity, which has frequently been identified as a significant predictor of negative health outcomes (Brown, et al., 2004; Campbell, 2008).

Our findings suggest that acute symptoms of PTSD have a short-term health impact but what drives physical health outcomes in the long-term relates more specifically to symptoms underlying depression. Thus, understanding how time influences the relationship between PTSD and health as well as how depression may change in relation to PTSD symptoms is also an important area to explore. For example, it is possible that in our study, during the two year time lag between the occurrence of the initial traumatic event and when PTSD symptoms and physical health were first assessed simultaneously (two years later), important shifts had already occurred. Perhaps subtle changes in PTSD symptoms influence this relationship. Schnurr and Green (2004)

suggest that the relationship between PTSD and physical health, specifically how it changes over time, may shift in subtle or delayed ways. For example, it is possible that avoidance and hyperarousal symptoms influence health earlier in the course of PTSD symptoms while over time, these symptoms gradually result in decreased social interaction and loss of relationships, a symptom also commonly seen in depression. Time may be an important factor when assessing how symptom changes impact health and it is possible that the present study was unable to capture these lagged effects due to measurement intervals.

Because our results indicate that time might play an important role, we believe that it would be important to assess PTSD and health every month for one year or longer in order to assess the subtle processes that might occur over shorter periods of time

Alternatively, our findings may indicate the importance of utilizing structured interviews aimed at capturing symptomatic differences. For example, our use of symptom inventories may have lacked some of the specificity required to adequately assess PTSD and depression symptoms. Further, our use of a self-report measure for physical health might have introduced biases related to memory or mood. The use of objective health ratings, such as visits to the doctor and diagnoses, would also contribute additional objective data to our understanding of these women's health.

Our study has several additional limitations that should be acknowledged. First, subjects were help-seeking women seeking services for domestic violence and do not represent a community sample of women with IPV. The majority of our sample experienced either reduced or no violence following the initial interview that originally qualified them for the study. Thus, our findings may be limited in terms of

generalizability to a community sample of women experiencing ongoing IPV. Another possible limitation includes a lack of control for length of time since prior violence.

While women entering the study had experienced violence within the last 3 months, the current study utilized health data that was obtained 2 years later. Thus, we were only able to compare health over a shorter period of time and during a time when participants were more likely to be experiencing less symptomatology.

Our findings highlight the importance of continuing to conduct longitudinal research regarding the role of mental health in predicting physical health in women with IPV. We have identified several important areas in need of continued research including implementing incremental assessment strategies over time aimed at capturing subtle shifts in mental and physical health symptoms. Further, we highlight the need to continue to focus on understanding the course of PTSD and depression specifically in women with IPV to further understand the process of how these symptoms interact and impact health in the long-term.

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