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THE LONGITUDINAL RELATIONSHIP BETWEEN SOCIAL SUPPORT AND PTSD
IN IRAQ AND AFGHANISTAN VETERANS: SOCIAL SELECTION OR SOCIAL
CAUSATION, AND DOES ASSESSMENT MODALITY MATTER?

by

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Abstract

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Although there is a strong and consistent association between social support and PTSD, the directionality of this association has been debated, with some researchers proposing that social support protects against PTSD, whereas other researchers suggest that PTSD erodes social support. The majority of studies in the literature have been cross-sectional, rendering causality impossible to determine. Cross-lagged panel models overcome many previous limitations but findings within the few studies employing these designs have been mixed. The current study used a cross-lagged panel structural equation model to explore the relationship between social support and PTSD over a one-year period in a sample of 264 OEF/OIF/OND Veterans. Two separate models were run, with one model using self-report assessed PTSD and the other model using clinician assessed PTSD. Excellent model fit was found for both models. Results indicated that the relationship between social support and PTSD was affected by assessment modality, with the self-report model finding a bidirectional relationship between social support and PTSD over time, whereas the clinician assessed model found only that baseline PTSD affected social support one year later. Findings highlight the importance of utilizing longitudinal data to better understand the relationship between social support and PTSD and suggest that assessment modality is one factor that can impact the associations between these constructs. The implications of these models are discussed within the context of previous research, with suggestions for the growing body of literature utilizing these designs to dismantle this complex association.

Table of Contents

Chapter		Page
1	Introduction	1
	Social Support and PTSD	3
	Social Causation in PTSD	5
	Social Selection in PTSD	8
	Limitations within the Cross-Sectional Literature	10
	Longitudinal Associations between Social Support and PTSD	11
	Limitations within the Longitudinal Literature	18
	Cross-Lagged Panel Models	18
	Synthesis of the Previous Literature	23
	Aims & Hypotheses	24
2	Method	26
	Participants	27
	Procedures	27
	Measures	28
3	Data Analysis	31
4	Results	33
	Sample Characteristics and Bivariate Correlations	33
	Models without Control Variables	35
	Models with Control Variables Included	37
5	Discussion	41
	References	54

List of Tables

Table		Page
1.	Longitudinal Studies Examining Social Support as a Predictor of PTSD	14
2.	Longitudinal Studies Examining PTSD as a Predictor of Social Support	16
3.	Cross-Lagged Panel Studies Examining the Relationship Between Social Support and PTSD	21
4.	Sample Demographics at Baseline (N = 264)	34
5.	Intercorrelations, Means, and Standard Deviations for the PDSS, PCL-M, and CAPS Total Scores at Baseline and Annual Time Points	36

The Longitudinal Relationship Between Social Support and PTSD in Iraq and Afghanistan Veterans: Social Causation or Social Selection, and Does Assessment Modality Matter?

Posttraumatic stress disorder (PTSD) is a stress-related disorder that develops after exposure to trauma, an event that is referred to in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013) as a Criterion A event. A Criterion A event occurs when a person is exposed “to actual or threatened death, serious injury, or sexual violence” (p. 271). According to the DSM-5 criteria for PTSD, individuals can directly experience a trauma, witness a trauma, or learn of a trauma experienced by a close other (e.g., spouse). Additionally, a recent change from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) to DSM-5 now includes repeated exposure to the aftermath of a trauma (e.g., police officers handling human remains) under the realm of a Criterion A event.

Data suggest that exposure to a Criterion A event is not a rare occurrence, with one nationwide study (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) finding that 51% of women and 61% of men acknowledged experiencing at least one traumatic event at some point in their lives. Other large epidemiological studies have documented similar exposure rates (Norris, 1992; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Despite a large proportion of the population experiencing a traumatic event, most individuals do not go on to develop PTSD. Research suggests that roughly 20% of women and 9% of men who have been exposed to a trauma will develop PTSD (Kessler, 1995), although the conditional risk for the development of PTSD tends to vary depending upon the type of trauma experienced (Breslau, 2012). National surveys have estimated the lifetime prevalence rate of a diagnosis of PTSD to be approximately 6.8% (Breslau, 2012; Kessler et al., 2005).

PTSD, previously characterized in DSM-IV (APA, 2000) by three clusters consisting of re-experiencing symptoms, avoidance/numbing symptoms, and hyperarousal symptoms, has now been expanded in DSM-5 to include four clusters of symptoms, based upon previous factor analytic research (e.g., King, Leskin, King, & Weathers, 1998; Suvak, Maguen, Litz, Silver, & Holman, 2008). Clusters of symptoms include re-experiencing symptoms (e.g., nightmares, intrusive memories), avoidance symptoms (e.g., avoiding people or places associated with the trauma), hyperarousal symptoms (e.g., irritability, hypervigilance), as well as a new cluster consisting of alterations in cognitions and mood (e.g., negative beliefs about oneself, shame or guilt, emotional numbing).

PTSD is associated with a range of conditions that may both contribute to and be affected by the disorder, including chronic pain, depression, traumatic brain injury, poor physical health, as well as occupational and social impairment. One study found a dose-response relationship between PTSD symptoms and quality of life (Schnurr, Hayes, Lunney, McFall, & Uddo, 2006). Additionally, Olatunji, Cisler, and Tolin (2007) conducted a meta-analysis comparing the quality of life in individuals experiencing a variety of mental health disorders and found that PTSD had the largest impact upon multiple areas of functioning. Deykin et al. (2001) found that patients with a diagnosis of PTSD made approximately 30% more health care visits compared to patients with partial or no PTSD. Consequently, identifying factors that are involved in the etiology and maintenance of PTSD has important public health and financial implications. Moreover, being able to specify which variables increase the risk for PTSD, as opposed to variables affected by the disorder, may also inform PTSD treatments.

Social Support and PTSD

A factor that has received considerable interest in the trauma literature has been social support. Given the complex nature of interpersonal processes, social support has been defined in various ways, but can be broadly conceptualized as “social interactions or relationships that provide individuals with actual assistance or that embed individuals within a social system believed to provide love, caring, or sense of attachment to a valued social group or dyad” (Hobfoll, 1988, p. 121). With regard to how social support has been operationalized in the literature, the assessment of support generally falls along two lines: the type of support provided and the provider of the support (i.e., the domain of support). The types of support provided have commonly been grouped into emotional and instrumental support (King, King, & Vogt, 2003; Monson, Fredman, & Dekel, 2010). Emotional support consists of attending to a person’s emotional needs, such as providing empathy or comfort during times of stress. Instrumental support is conceptualized as providing tangible support that assists a person with completing a specific goal or need, such as helping a loved one clean the house or driving someone to the doctor. Domains of support refer to the source of support, and can include a variety of social networks such as family, friends, and significant others.

One consistent finding in the literature has been an association between PTSD and social support. Two important large-scale meta-analyses were conducted by Brewin, Andrews, and Valentine (2000) and Ozer, Best, Lipsey, and Weiss (2003). In Brewin and colleagues’ (2000) study of 14 risk factors for PTSD, they found that preexisting attributes of being female, younger, lower socioeconomic status, lower education, lower IQ, and minority status were all significant predictors of PTSD. However, effect sizes were relatively small for these characteristics, ranging from .06 to .18. Life stress ($r = .32$) and trauma severity ($r = .23$) showed

larger effect sizes in association with PTSD; however, the strongest predictor of PTSD was social support, with an effect size of .40. Ozer and colleagues' (2003) meta-analysis examined seven risk factors for PTSD, namely prior trauma, prior psychological adjustment, family history of psychopathology, perceived life threat during trauma, posttrauma social support, peritraumatic emotional responses, and peritraumatic dissociation. The weighted average values between each of the predictors and PTSD was as follows: prior trauma ($r = .17$), prior psychological adjustment ($r = .17$), family history of psychopathology ($r = .17$), perceived life threat ($r = .26$), posttrauma social support ($r = -.28$), peritraumatic emotional response ($r = .26$), and peritraumatic dissociation ($r = .35$). As evidenced in these and additional studies (e.g., Keane, Scott, Chavoya, Lamparski, & Fairbank, 1985; King, King, Foy, Keane, & Fairbank, 1999; Solomon & Mikulincer, 1990), social support appears to share a strong association with PTSD.

Social support has also been shown to be an important variable in treatment outcomes for PTSD. Thrasher, Power, Morant, Marks, and Dalgleish (2010) conducted a randomized clinical trial of prolonged exposure therapy, cognitive therapy, and relaxation training in a mixed-trauma sample of 77 individuals. The authors found that pre-treatment social support was the only significant predictor of change in PTSD symptoms from pre-treatment to post-treatment ten sessions later. Another study by Price, Gros, Strachan, Ruggiero, and Acierno (2013) examined the role of four aspects of social support on prolonged exposure therapy effectiveness in sample of 69 Iraq/Afghanistan veterans, including emotional/informational support, positive social interaction, affectionate support, and tangible support. The authors found that while positive social interaction was associated with lower PTSD symptoms at pre-treatment, emotional/informational support at pre-treatment was associated with fewer PTSD symptoms at

the end of therapy. These studies suggest that interpersonal support is also associated with outcomes in commonly utilized treatments for PTSD.

Social Causation in PTSD

Many theories have been put forward to explain the strong association between social support and PTSD. One set of theories, collectively referred to as social causation theories, view social support as having an antecedent effect upon PTSD. Within this framework, social support is viewed as a predictor of response following trauma, and a variable that can affect the onset, maintenance, and remission of PTSD. One specific theory within the realm of social causation that has received significant attention in the trauma literature concerns the buffering effects of social support. This theory speculates that higher levels of social support protect against the negative consequences of trauma exposure, including PTSD. One of the first notable papers to speculate about this process was a study by Cohen and Wills (1985) examining buffering effects of social support upon general stress. The authors theorized that social support served as a buffer by preventing the development of distress following stress exposure, as well as by alleviating existing distress through alteration of distress appraisals. Buffering theories specific to PTSD include assertions by Joseph, Williams, and Yule (1997), who hypothesized that interactions with a supportive person in a trauma victim's interpersonal network modifies maladaptive posttraumatic cognitions (e.g., the world is dangerous) thought to be central to the development of PTSD (Dunmore, Clark, & Ehlers, 1999; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). These authors theorized that positive interactions with a supportive person also prevent maladaptive cognitions, resulting in more benign traumatic appraisals following trauma and possibly preventing the development of PTSD.

Social causation theories have also speculated about the role of a lack of social support in shaping PTSD symptoms. Ehlers and Clark (2000) proposed a cognitive model of PTSD in which they theorized that PTSD develops as a result of dysfunctional cognitions occurring after trauma exposure. They also suggested that unsupportive behaviors from those within a trauma victim's social network have the potential to encourage maladaptive posttraumatic appraisals. For example, a spouse's unwillingness to discuss the trauma could result in attributions of self-blame and perceived hostility, exacerbating PTSD symptoms such as avoidance of thinking or talking about the trauma. Ehlers and Clark also theorized that unsupportive reactions may encourage maladaptive coping following trauma, prolonging trauma symptoms. The social-cognitive processing model of adjustment to trauma (Lepore, 2001) also speculates about the role of interpersonal processes in shaping trauma cognitions. This model proposes that negative discourse with others reinforces negative posttraumatic cognitions, such as beliefs that the world is dangerous and that people are untrustworthy. As highlighted above, multiple theories within the social causation framework speculate that interpersonal processes alter the appraisals a victim makes post-trauma, which has a subsequent effect upon trauma pathology and PTSD.

Several studies have examined social support's relationship with PTSD from a social causation perspective. Kaniasty and Norris (1992) examined a sample of approximately 700 crime victims and found that those who were higher in social support were less likely to report PTSD symptoms compared to those who were low in social support. These authors concluded that social support served as a protective factor against the development of PTSD. Arnberg, Hultman, Michel, and Lundin (2012) studied 4,600 victims exposed to a tsunami and found that the relationship between social support and distress depended upon the level of trauma exposure. For those who experienced lower life threat from the tsunami, there was a negligible association

between social support and trauma-related distress; however, for those who experienced higher life threat from the tsunami, a significant negative relationship was found between social support and PTSD. Ullman and Filipas (2001) conducted a study with 323 victims of sexual assault and found that negative social reactions from others (e.g., blame for the trauma, being told to let go of the trauma) were significantly associated with more PTSD symptoms. The authors interpreted this association as “being treated differently or stigmatized by others after rape may cause victims to feel as though the incident has somehow permanently transformed them” (p. 383), leading to a heightening of PTSD symptoms. Relatedly, Belsher, Ruzek, Bongar, and Cordova (2011) conducted a mediation analysis with a mixed trauma sample of 39 individuals. The authors found that the association between social constraints (i.e., negative reactions from individuals in the trauma victims’ social network) and posttraumatic stress disorder was mediated by posttraumatic cognitions, drawing similar conclusions to Ullman and Filipas (2001).

Although experimental studies have been utilized less often to examine the relationship between social support and PTSD, several such studies have also suggested that social support shapes PTSD. Lepore, Ragan, and Jones (2000) had a non-clinical sample watch a stressful film clip. After viewing the film, individuals were randomized to talk about their reactions with either a supportive confederate, an unsupportive confederate, or to not talk to a confederate about their reactions. The individuals were then re-exposed to the same film a few days later. The authors found that individuals who talked to an unsupportive confederate had greater distress when re-exposed to the film compared to the two other conditions. In a similar study, Lepore, Fernandez-Berocal, Ragan, and Ramos (2004) included a group in which confederates encouraged participants to adopt more benign appraisals of a stressful film and found that this group showed the greatest cognitive, emotional, and physiological adjustment. Woodward and Beck (in press)

randomized 67 undergraduate females to watch a film clip depicting a sexual assault either with or without their romantic partners, finding that condition interacted with relationship quality. Among participants who watched the film clip with their romantic partner, individuals whose romantic partner reported low relationship quality had higher distress after the film than participants whose romantic partner reported high relationship quality. Partners' behaviors were also rated using an observational coding system, with results showing that negative emotional reactions from partners (e.g., criticism, hostility) were associated with more intrusive memories and film-related distress from participants. Notably, positive emotional reactions from partners had no effect on participants' distress. Many other studies have also found a relationship between social support and trauma symptoms, resulting in the widespread assumption that social support is a factor which shapes trauma response and subsequent PTSD (see Brewin et al., 2000 and Ozer et al., 2003).

Social Selection in PTSD

Given that PTSD encompasses a variety of symptoms relating to interpersonal functioning (e.g., feeling distant or cutoff from others), it is not surprising that studies have also theorized that reduced social support is a byproduct of PTSD, as opposed to a factor affecting the onset, development, and maintenance of PTSD. These theories are collectively referred to as social selection theories, and a variety of theories have been put forward within this framework. Some researchers have theorized that the development of PTSD results in caregiver burden, or caregivers' perception that their emotional and physical well-being has been adversely impacted by caring for an impaired loved one (Zarit, Todd, & Zarit, 1986). Another theory speculates that PTSD results in secondary traumatization of close others in a victim's support network (Figley, 1989). Specifically, significant others' attempts to empathize and understand a trauma victim

causes a significant other to take on the victim's experiences as their own, including thoughts, emotions, and memories, resulting in increased partner distress. Another line of research proposes that PTSD results in ambiguous loss, in which although the physical presence of a trauma victim remains, the person lacks an emotional presence (Boss, 2007). This emotional absence is then thought to produce distress in significant others and promote relationship discord. Monson, Stevens, and Schnurr (2004, 2006), in their cognitive-behavioral interpersonal theory of PTSD, assert that significant others may engage in behavioral accommodation of a trauma victim's symptoms in a paradoxical effort to help (e.g., driving the victim of a motor vehicle accident instead of requiring the victim to drive themselves). The authors state that this behavioral accommodation can also have a deleterious effect upon relationship satisfaction of the significant other, potentially through a reduction in mutually enjoyable activities (Monson, et al., 2010). Examined as a whole, a variety of social selection theories have been put forward, with the overarching supposition that the development of PTSD erodes social support and increases relationship discord.

Just as empirical research has examined social support as a predictor of PTSD, empirical research has also examined social support as a factor affected by PTSD, although these studies are fewer in number. Whisman, Sheldon, and Goering (2000) examined a sample of 5,000 couples in Canada and found that among couples where a romantic partner had a diagnosis of PTSD, couples were approximately four times more likely to have relationship conflict. A variety of studies have found that individuals with PTSD are significantly more likely to be divorced than individuals without PTSD (Davidson, Hughes, Blazer, & George, 1991; Kessler et al., 1995). Carroll, Rueger, Foy, and Donahoe (1985) found that veterans with a diagnosis of PTSD were less expressive with their partners and less likely to self-disclose. Fredman,

Vorstenbosch, Wagner, Macdonald, and Monson (2014) recently developed a measure of partner accommodation for individuals suffering from PTSD. The authors found that greater partner accommodation of symptoms was related to lower relationship satisfaction. Clapp and Beck (2009) assessed 458 victims of a motor vehicle accident and found that PTSD indirectly affected social support through negative network orientation (i.e., the belief that it is inadvisable or risky to utilize ones social network), suggesting that the development of PTSD may also distort perceptions about the utility of reaching out to others. This may also account for the association between low social support and increased PTSD symptoms. Taken as a whole, a variety of studies examining social support as an outcome of PTSD have found a relationship between low social support and PTSD, indicating that the development of PTSD may also result in a reduction in interpersonal resources and increase relationship conflict.

Limitations within the Cross-Sectional Literature

Studies examining social support from a social causation and social selection perspective have both found an association between PTSD and social support. However, despite a variety of studies documenting an association between social support and PTSD, it is difficult to draw definitive conclusions about whether social support affects or is affected by PTSD, as the vast majority of studies that have examined the relationship between PTSD and social support have been cross-sectional and retrospective in nature, making inferences about the directionality of this relationship difficult to determine (Kaniasty, 2005; Monson, Taft, & Fredman, 2009). Although examination of the relationship between social support and PTSD from a cross-sectional perspective can be informative, it is difficult to ascertain whether social support is a predictor or consequence of PTSD using this methodology. For example, although Ullman and Filipas (2001) found a relationship between negative social reactions and PTSD in their cross-

sectional study of sexual assault victims, concluding that negative social reactions may shape trauma attributions and PTSD, it is also possible that this association can be explained by chronic PTSD producing interpersonal arguments and negative social reactions (DePrince, Welton-Mitchell, & Srinivas, 2014). Consequently, understanding the dynamic between social support and PTSD may be better answered by studies examining this relationship within a longitudinal framework.

Longitudinal Associations between Social Support and PTSD

Although a number of studies have examined the relationship between interpersonal variables and PTSD cross-sectionally, only a handful of studies have looked at this relationship within a longitudinal framework. A review of the literature provided approximately eleven studies that have examined social support as a predictor of PTSD using longitudinal data (see Table 1). One of the first studies to find a significant longitudinal relationship was conducted by La Greca, Vernberg, Silverman, and Prinstein (1996) using a sample of 442 children exposed to Hurricane Andrew. The study assessed four sources of support, including support from classmates, parents, teachers, and close friends. Children were evaluated three, seven, and 10 months after a hurricane. After controlling for demographics, perceived life threat, and stressful life events, the authors found using linear regression that support from parents and classmates at three months' post-hurricane was negatively associated with PTSD seven months after the hurricane. Additionally, support from teachers seven months after the hurricane was negatively associated with PTSD 10 months after the hurricane. It should be noted though that in both analyses, the authors did not control for PTSD symptoms from the previous time point. A study by Zoellner, Foa, and Brigidi (1999) using 142 assault victims assessed the relationship between interpersonal friction and PTSD. Linear regression analyses, controlling for baseline PTSD

symptoms, showed that interpersonal friction two weeks after the assault predicted PTSD symptoms three months later. Similar work by Yuan et al. (2011) in a sample of 233 police officers found that better social adjustment during police academy training was associated with fewer PTSD symptoms two years later, after controlling for trauma exposure and demographic variables. Studies by Holeva, Tarrrier, and Wells (2001) and Koenen, Stellman, Stellman, and Sommer (2003) examined PTSD as a categorical outcome, with Holeva et al. using a motor vehicle accident sample and Koenen et al. using a veteran sample. Both studies found that social support negatively predicted subsequent PTSD. Lastly, a study by Dirkzwager, Bramsen, and van der Ploeg (2003) examined the longitudinal effects of positive and negative support in a sample of 311 peacekeepers in Lebanon. The authors found that both positive and negative support at baseline were associated with PTSD symptoms two years later. However, a significant limitation within this study is that individuals were not screened for trauma exposure, making it uncertain if all participants had actually experienced a trauma.

Although the longitudinal studies listed above found that social support served as a predictor of subsequent PTSD symptoms, an equal number of studies failed to find this association. Robinaugh et al. (2011) initially found an association between social support four weeks after a motor vehicle accident and PTSD 12 weeks later. This relationship became non-significant when including posttraumatic cognitions in the analysis, with the authors interpreting this finding as suggesting that social support may shape PTSD through alteration of posttraumatic cognitions. Ren, Skinner, Lee, and Kazis (1999), using a sample of approximately 2,500 veterans, initially found a negative association between perceived support measured at baseline and PTSD symptoms measured one year later. However, this relationship became non-significant when controlling for demographic variables and baseline PTSD symptoms. Similarly,

Banks and Weems (2014), studying a sample of 192 youth exposed to a hurricane, found that the relationship between peer support 24 months after the hurricane and PTSD six months later became non-significant when controlling for demographic variables, trauma exposure, and PTSD symptoms at baseline. Bryant-Davis and colleagues' (2015) examination of sexual assault victims also failed to find a longitudinal association between social support at baseline and PTSD one year later, only finding a significant relationship cross-sectionally between social support and PTSD. As evidenced above, longitudinal studies examining social support as a subsequent predictor of PTSD symptoms appear mixed, particularly when covariates such as baseline symptomatology are included.

Fewer studies have examined the longitudinal effects of PTSD on social support, with an examination of the literature producing five studies that have examined social selection processes longitudinally (see Table 2). One of the first notable studies to examine this relationship was conducted by Keane and colleagues (1985). This study grouped 45 veterans into three categories encompassing veterans with PTSD, well-adjusted veterans with no PTSD, and hospitalized non-PTSD veterans. Veterans were then asked to retrospectively report on their social support prior to entering the military, one to three months after discharge, and at the present time of the study. Results showed that the group with PTSD reported significant reductions in social support over time relative to the two comparison groups, who did not show a reduction in support across time. Although having veterans retrospectively report on social support across various time points represents a significant limitation of this study, this was one of the first studies to highlight that PTSD may result in erosion of social support over time. A later study by Solomon and Mikulincer (1999) assessed 255 Israeli soldiers exposed to combat during the 1982 Lebanon war. Bivariate correlations revealed a negative association between PTSD one

Table 1

Longitudinal Studies Examining Social Support as a Predictor of PTSD

Study	Sample Size	Sample	Time Frame Examined	Type of analysis	Additional Variables included in Analysis
LaGreca et al. (1996)	442	Children exposed to a hurricane	3, 7, & 10 months post-hurricane	Linear regression	Perceived life threat, stressful life events, demographics, coping style
Ren et al. (1999)	2,425	Male veterans	Baseline and 12 months after baseline	Linear regression	Age, education, work status, marital status
Zoellner et al. (1999)	142	Victims of sexual and nonsexual assault	2 weeks post-assault and 3 months post-assault	Linear regression	Baseline PTSD, assault type
Holeva et al. (2001)	265	Motor vehicle accident victims	2-4 weeks post-accident and 4-6 months post-accident	Logistic regression	Age, gender, injury, thought control strategies, prior car accidents, acute stress disorder
Koenen et al. (2003)	1,377	American Legionnaires serving in Asia during Vietnam War	1984 and 1998	Logistic regression	Baseline PTSD, demographics, combat exposure, alcohol, depression, anger

Table 1 (continued)

Longitudinal Studies Examining Social Support as a Predictor of PTSD

Study	Sample Size	Sample	Time Frame Examined	Type of analysis	Additional Variables included in Analysis
Dirkzwager et al. (2003)	311	Peacekeepers in Lebanon	1996 and 1998	Linear regression	Deployment stress, baseline PTSD, coping strategies
Robinaugh et al. (2011)	102	Motor vehicle accident victims	4 weeks post-accident and 16 weeks post-accident	Linear regression	Posttraumatic cognitions, baseline PTSD
Yuan et al. (2011)	233	Police officers	During police academy training and 24 months later	Linear regression	Race, critical incidents, world assumptions
Banks et al. (2014)	192	African American youth exposed to a hurricane	24 months post-hurricane and 30 months post-hurricane	Linear regression	Gender, age, stressful life events, hurricane exposure, baseline PTSD
Han et al. (2014)	835	U.S. Army and National Guard Soldiers	91 days before deployment and 73 days post-deployment	Linear regression	Age, education, baseline PTSD, combat experience, stressful life events
Bryant-Davis et al. (2015)	252	African American female sexual assault victims	Baseline and one year later	Linear regression	Baseline PTSD, age, education, religious coping

Table 2

Longitudinal Studies Examining PTSD as a Predictor of Social Support

Study	Sample Size	Sample	Time Frame Examined	Type of analysis	Additional Variables included in Analysis
Keane et al. (1985)	45	Male Vietnam veterans	1-3 months prior to entering service, 1-3 months following discharge, & the present study time	Repeated measures ANOVA	None
Solomon & Mikulincer (1999)	255	Israeli soldiers	1 year after the end of war & 1 year later	Bivariate correlation	None
Erbes et al. (2011)	313	Married or partnered Iraq veterans	2-3 months post-deployment and one year post-deployment	Structural equation modeling	Baseline relationship adjustment
Hall et al. (2014)	96	Torture survivors in Iraq	Baseline and 5 months later	Logistic regression	Grief, depression, anxiety
DePrince et al. (2014)	236	Victims of intimate partner violence	Baseline and one year later	Linear regression	Age, socioeconomic status, race, incident characteristics, baseline social support

year after the end of the war and social support assessed one year later; however, the authors did not examine this relationship beyond a correlation. Hall, Bonanno, Bolton, and Bass (2014) conducted a study using 96 Iraqi torture survivors to examine how PTSD affected social integration. Using logistic regression, the authors found that greater PTSD severity at baseline was associated with lower levels of social integration five months later. Additionally, analyses using change scores found that greater reduction in PTSD was associated with more social contact at time two. However, this study had several methodological weaknesses, including categorizing individuals into loss/gain of social resources groups based on item scores and standard deviation values and not controlling for baseline PTSD symptoms. Lastly, a study by DePrince et al. (2014) explored the interplay between PTSD and positive versus negative social reactions in 236 female victims of intimate partner violence. After controlling for demographic variables and depression at baseline, linear regression analyses found that PTSD at baseline (an average of 28 days after the abuse) was positively associated with negative social reactions one year later. No relationship was found between PTSD at baseline and positive social reactions one year later.

Of the five studies examining social selection processes longitudinally, only one study by Erbes, Meis, Polusny, and Compton (2011) did not find a longitudinal association between PTSD and subsequent social support. This study assessed the association between PTSD symptom clusters in 313 partnered Iraq veterans. Using structural equation modeling, analyses failed to find an association between any PTSD symptom cluster two to three months post-deployment and relationship adjustment one year later, although a cross-sectional association was found between dysphoria symptoms and PTSD at baseline.

Limitations within the Longitudinal Literature

In comparison to the large number of studies examining social support and PTSD in a cross-sectional framework, far fewer studies have examined this relationship longitudinally. Longitudinal findings within the social causation literature appear to be mixed, and few studies have examined social selection processes longitudinally. It is also worth noting that studies within the longitudinal literature have had a number of limitations. Several of the studies that have examined longitudinal pathways have not controlled for baseline PTSD or social support, making it unclear whether a longitudinal association found between social support and PTSD may actually be due to the influence of prior levels of these constructs. Many studies also do not report information on how long ago the trauma occurred, making it unclear how the intervals examined relate to time elapsed since trauma exposure, a potentially informative variable. Another significant limitation within the literature noted above is that studies have only examined social support as either a predictor *or* outcome of PTSD. Interpersonal relationships might both shape and be shaped by trauma symptoms, suggesting this relationship may be bidirectional (Monson et al., 2010). However, as most studies have not tested for both pathways, it is difficult to draw conclusions about support for social causation versus social selection processes, particularly when a lack of an association between PTSD and social support is found (e.g., Banks & Weems, 1992; Bryant-Davis et al., 2015; Lee & Kazis, 1999).

Cross-Lagged Panel Models

Cross-lagged panel designs, also known as causal models, linear panel models, or autoregressive models, are a type of longitudinal analysis that allows for testing of bidirectional relationships within the same model (Bentler, 1980; Bollen & Curran, 2006; Selig & Little, 2012). These models are used when variables have been measured repeatedly over more than one

time point (e.g., Ramchand, Marshall, Schell, & Jaycox, 2008; Stavrakakis, de Jonge, Ormel, & Oldehinkel, 2012). Cross-lagged panel models are advantageous in that in addition to being able to test bidirectional pathways, these designs can account for cross-sectional associations between two variables measured at the same time point (e.g., variable A and variable B at time point 1). These models also account for the association between the same variables over time (e.g., variable A at time one and variable A at time two), helping determine whether variables of interest actually influence one another over time. These models overcome a number of limitations within the previous literature discussed above and may provide a better method of determining how social support and PTSD influence one another over time.

Despite the utility these models have, only a handful of studies in the trauma literature have used cross-lagged models to explore the association between social support and PTSD. The first study included 2,249 male veterans from the Gulf War (King, Taft, King, Hammond, & Stone, 2006). Veterans were assessed 18 to 24 months post-deployment and assessed again five years later. Using cross-lagged panel structural equation modeling (SEM), analyses showed that self-reported PTSD 18 to 24 months post-deployment predicted perceived social support five years later; however, no association was found between social support 18 to 24 months post-deployment and PTSD five years later. King et al. (2006) concluded that although many researchers have focused on social support as a causal agent in PTSD, their study suggested that social support may be better conceptualized as a factor influenced by PTSD. The second study by Kaniasty and Norris (2008) assessed 557 victims of severe flooding in Mexico. Social support and PTSD were measured at 6, 12, 18, and 24 months post-flood. Data were analyzed using cross-lagged SEM, controlling for gender, age, education, marital status, severity of exposure to disaster, and sample location (non-significant covariates were excluded from the model, although

the authors do not specify which covariates were removed). Analyses indicated that assessment time point influenced the relationship between social support and PTSD. From six months to twelve months post disaster, social support predicted subsequent PTSD although the reverse was not found; from 12 months to 18 months post-disaster, a bidirectional relationship was found between social support and PTSD; and from 18 to 24 months post disaster, only PTSD predicted later social support. The third study included a sample of 116 veterans (era unknown) being treated for cannabis dependence (Carter et al., 2016). Veterans were assessed every two months over a six month period (time since trauma unknown). Cross-lagged panel analyses using path analysis found that PTSD at each time point negatively predicted subsequent social support, but no associations were found between social support and subsequent PTSD. It should be noted that the researchers constrained all the cross-lagged coefficients from PTSD to subsequent social support to equality as they assumed that the strength of this relationship would not change over time, an assumption that has not been demonstrated in the literature. This may have resulted in different effects than if these pathways were allowed to be freely estimated (i.e., find estimates that best reproduce the observed data), which is how previous studies have estimated these pathways. The final and most recent study (Fredman et al., in press) used cross-lagged panel analyses in path analysis to explore the longitudinal association between PTSD and dyadic conflict communication in 114 survivors of a motor vehicle accident. Motor vehicle accident survivors were assessed 4 and 16 weeks post-accident. Analyses indicated that PTSD 4 weeks post-accident was negatively associated with dyadic conflict communication 16 weeks post-accident; however, the reverse relationship was not found.

Table 3

Cross-Lagged Panel Studies Examining the Relationship Between Social Support and PTSD

Study	Sample Size	Sample	Time Frame Examined	Type of analysis	Additional Variables included in Analysis
King et al. (2006)	2,249	Gulf War veterans	18 to 24 months post-deployment) and 5 years later	Structural equation Modeling	None
Kaniasty & Norris (2008)	557	Natural Disaster victims in Mexico	6 months to 2 years after disaster (assessed every 6 months)	Structural equation modeling	Unknown
Carter et al. (2016)	116	Veterans (era unknown)	Baseline to 6 months later (assessed every 2 months)	Path analysis	None
Fredman et al. (under review)	114	Motor vehicle accident survivors	4 weeks post-accident and 16 weeks post-accident	Path analysis	None

Although these studies have examined the directionality between social support and PTSD using more nuanced methodology, findings again appear mixed. All four studies found support for social selection processes in PTSD, whereas Kaniasty and Norris (2008) was the only study to find evidence for social support as a predictor of subsequent PTSD. However, Kaniasty and Norris used a sample of natural disaster victims. Whether findings may generalize to other trauma samples, namely samples experiencing interpersonal traumas (e.g., veterans) is unclear, particularly given several studies documenting differences in trauma pathology and social stigma for victims of interpersonal vs. non-interpersonal traumas (Charuvastra & Cloitre, 2008; Kessler et al., 2005). Interpersonal trauma victims may be more likely to experience blame for the event from others, compared to non-interpersonal trauma victims. As well, victims of interpersonal trauma may also be more likely to perceive behaviors from those within their interpersonal network as hostile due to the nature of their trauma (Charuvastra & Cloitre, 2008; Punamäki, Komproe, Quoata, El-Masri, & de Jong, 2005). These studies have also significantly differed on a number of additional characteristics, including elapsed time since trauma exposure and the time between assessment points within their longitudinal frameworks. Findings from Kaniasty and Norris (2008) suggest that the amount of elapsed time since trauma exposure may be a relevant factor that influences the relationship between social support and PTSD over time, although researchers have also failed to report this information within cross-lagged panel studies (e.g., Carter et al., 2016). Additionally, the time interval between assessment points in panel designs may be another factor that influences the cross-lagged associations between the variables of interest (Dormann & Griffin, 2015). As demonstrated above, these intervals have varied widely among studies, which may also account for discrepancies in findings. In sum, there appears to be more consistent support for social selection processes within cross-lagged panel studies as

opposed to social causation processes; however, as only a handful of studies have been conducted and studies have varied widely in their methodology, additional cross-lagged panel studies are needed to further understand the relationship between PTSD and social support.

Synthesis of the Previous Literature

Taken as a whole, studies examining whether social support serves as a predictor or outcome of PTSD have had a number of limitations. Most studies have been cross-sectional in nature, making it difficult to understand directional relationships between these variables. Furthermore, the majority of the longitudinal literature has not tested the relationship between social support and PTSD bidirectionally or controlled for baseline associations, potentially leading to erroneous conclusions about the dynamic between social support and PTSD. Another limitation within the literature discussed above is that the vast majority of studies, with the notable exception of Kaniasty and Norris (2008), have assessed PTSD using self-report measures instead of clinician interview. Although considerable overlap is found within the trauma literature between self-report and clinician-assessed PTSD, several studies incorporating both assessment modalities have found discrepancies in findings when self-report and clinician assessed PTSD are compared (Cody, Jones, Woodward, Simmons, & Beck, 2015; Macdonald, Greene, Torres, Frueh, & Morland, 2013; Monson et al., 2008; Woodward et al., 2013). Self-report measures of PTSD provide a rapid assessment of trauma pathology, but it is possible that these measures may also be more sensitive to general distress (Cody et al., 2015; Woodward et al., 2013). Clinician-based assessment may provide a more objective assessment of PTSD symptoms but has been seldom used within this literature, and no studies in the cross-lagged panel literature have used the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), considered the gold-standard assessment of PTSD. Additionally, no cross-lagged panel studies

have compared findings across self-report and clinician assessed PTSD. This may be important given previous trauma studies suggesting that assessment modality can impact findings (Beck, Grant, Clapp, & Palyo, 2009; Woodward et al., 2013) and that studies using cross-lagged panel models to examine these associations have varied in terms of the assessment modalities they have used. These limitations have contributed to a lack of clarity in understanding the relationship between social support and PTSD, as few studies have employed more complex methodology to examine causal associations within this literature.

Aims & Hypotheses

Aims

The purpose of the current study was to explore the directionality of the association between social support and PTSD within a one year interval in a sample of Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) veterans (an interpersonal trauma sample) using cross-lagged structural equation modeling. Additionally, a second aim of the study was to examine whether findings varied depending upon assessment modality, through use of a self-report measure of PTSD (i.e., the PTSD Checklist; Weathers, Litz, Herman, Huska, & Keane, 1993) and clinician based assessment of PTSD (i.e., the CAPS; Blake et al., 1995). A final aim of the study was to explore the impact of covariates that may influence the associations between social support and PTSD. Several studies, including the literature highlighted above, have suggested that there are various factors that may shape the relationship between social support and PTSD. However, the cross-lagged panel literature has yet to incorporate these variables into their models to explicitly examine their impact. Findings from Kaniasty and Norris (2008) suggest that the elapsed time since the trauma occurred may be one neglected variable that influences the directionality of the relationship between social

support and PTSD. There are also a number of variables that, in addition to conferring greater risk for PTSD, have also been shown to reduce social support. Individuals with depression are more likely to isolate themselves from others and experience reduced social connectedness (Cruwys, Haslam, Dingle, Haslam, & Jetten, 2014; Wade & Kendler, 2000). Trauma exposure itself has also been shown to reduce levels of social support (Kaniasty & Norris, 1993), indicating that individuals who have experienced additional traumas within this sample may have poorer social support. Mental health treatment utilization might also be another factor that influences the relationship between these variables, given that social isolation and social dysfunction are targeted in many mental health interventions, which may lead to an improvement in social functioning for individuals receiving mental health treatment compared to individuals who have not received mental health treatment. In order to examine the impact of these variables on the relationship between social support and PTSD, we included elapsed time since the occurrence of the deployment-related trauma (assessed at baseline), baseline depression, the number of civilian traumas (assessed at baseline), and whether participants received mental health treatment in between the baseline and annual time points as control variables in additional models.

Hypotheses

Although several cross-sectional studies have theorized that social support serves as a predictor of PTSD, findings from cross-lagged panel studies have been mixed with regard to this pathway. Results from Kaniasty and Norris (2008) found evidence that social support negatively predicted subsequent PTSD 12 and 18 months after a trauma in sample of natural disaster victims, but this pathway was not significant when examining intervals after 18 months post-disaster. King and colleagues did not find that social support 18 to 24 months predicted PTSD

five years later in a sample of veterans returning from deployment. These findings may suggest that social causation processes are more likely to occur closer in proximity to a trauma. Given that the current study recruited a sample of veterans returning on average several years after deployment, it was predicted in Hypothesis 1 that there would not be a significant association between social support at baseline and PTSD one year later.

Multiple previous studies employing similar methodology have found evidence that PTSD predicted subsequent social support (e.g., Kaniasty & Norris, 2008; King et al., 2006). Consequently, it was predicted in Hypothesis 2 that there would be support for social selection processes, in that PTSD at baseline would demonstrate a significant negative association with social support assessed one year later.

Hypothesis 3 concerned the impact of assessment modality on findings. Participants' may be more likely to overestimate their PTSD symptoms in self-report than when assessed using clinician interview, resulting in reporting bias (Cody et al., 2015). Relatedly, previous research has revealed that variables assessed using similar methodology will be more likely to correlate with each other than variables assessed using dissimilar methodology (Kazdin, 2003). As social support was measured using self-report, social support may be more strongly associated with self-reported PTSD than clinician assessed PTSD. Consequently, it was predicted in Hypothesis 3 that social support would show stronger associations with PTSD in the model using self-reported PTSD than the model using clinician-assessed PTSD.

Method

Participants

Participants initially included 309 veterans from Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) who participated in a larger

study examining functional outcomes in OEF/OIF/OND veterans (i.e., Study Evaluating Returning Veterans' Experiences; Project SERVE). Participants were recruited from locations across the Central Texas Veterans Healthcare System (CTVHCS) using a variety of methods, including mailings, advertisements at veterans' organizations and VA hospitals (e.g., flyers), and in-person presentations to VA staff (e.g., OEF/OIF/OND coordinators). Both male and female veterans were recruited for the study.

Participants were included in the larger study if they were an OEF/OID/OND veteran of at least 18 years of age. Additional criteria included ability to understand and provide informed consent, ability to complete assessment procedures, and agreement to be contacted for follow-up assessments. Individuals were excluded from the larger study if they had plans to move out of the CTVHCS area within four months of the baseline assessment ($n = 1$) or were diagnosed with a psychotic disorder or bipolar disorder determined during the baseline assessment ($n = 21$). An additional 45 participants were excluded as they did not experience an OEF/OID/OND related criterion A event for PTSD, bringing the final sample to 264 participants.

Procedures

Potential participants were screened over the telephone to determine initial study eligibility. Once initial eligibility was determined, participants then scheduled an in-person baseline appointment for a more in-depth assessment. At the baseline appointment, participants completed a clinical interview assessing PTSD symptoms, as well as a variety of self-report measures spanning demographic variables, military service experiences, mental health symptoms, social support, and functional impairment. Participants were then contacted one year later to complete another in-person appointment assessing similar outcomes. All procedures were approved by the local Institutional Review Board.

Measures

Social Support. Social support was assessed using the Deployment Risk and Resilience Inventory (DRRI; King et al., 2003). The DRRI is a comprehensive measure containing 13 individual self-report scales assessing a variety of pre-deployment, deployment, and post-deployment factors, including social support. The Post-Deployment Social Support scale (PDSS) was used to assess social support in the current study. The PDSS contains fifteen items assessing emotional and instrumental support, including reception as a veteran (e.g., “The American people made me feel at home when I returned”), support from family and friends (e.g., “I am carefully listened to and understood by family members or friends”), and general support (e.g., “There are people to whom I can talk about my deployment experiences”). Items are rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale. A total score can be calculated by summing all fifteen items, with higher scores indicating a greater level of support. Previous research has found the PDSS to have excellent psychometric properties across a variety of samples (King, King, Vogt, Knight, & Samper, 2006), including high internal consistency (Cronbach’s alpha \geq .84). Cronbach’s alpha for the total scale in the current study was .87 at baseline and .89 at the annual time point.

PTSD. PTSD within the past month was assessed using criteria from DSM-IV-TR (APA, 2000), as data collection began prior to the publication of DSM-5 (APA, 2013).

Self-Reported PTSD. Self-reported PTSD was assessed using the PTSD Checklist-Military Version (PCL-M; Weathers et al., 1993). The PCL-M consists of seventeen items that map onto DSM-IV-TR symptom criteria for PTSD (APA, 2000), and is one of the most widely used self-report measures of PTSD assessment. Items are rated on a 1 (*not at all*) to 5 (*extremely*) scale, with higher scores indicating greater severity of PTSD. The scale has shown excellent

psychometric properties in previous research, with an internal consistency ranging from .94 to .97 (Blanchard et al. 1996, Weathers et al. 1993). Cronbach's alpha for the current study was .96 at both the baseline and annual time points.

Clinician Assessed PTSD. Clinician assessed PTSD was evaluated using the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995). The CAPS is a semi-structured interview administered by trained interviewers. Like the PCL-M (Weathers et al., 1993), the CAPS measures PTSD symptoms according to DSM criteria, and was used in this study to assess symptomatology according to DSM-IV-TR (APA, 2000). Participants were asked to describe the most traumatic event they experienced while deployed, and the CAPS was administered with regard to this event. This was also used to determine whether participants' experiences met criterion A for PTSD (APA, 2000). The CAPS assigns individual symptoms a frequency score ranging from 0 (*the symptom does not occur*) to 4 (*the symptom occurs nearly every day*), as well as an intensity score ranging from 0 (*not distressing*) to 4 (*extremely distressing*). Frequency and intensity scores from individual symptoms can be summed to create total scores for either PTSD symptom clusters or overall PTSD severity. The CAPS is widely considered the gold-standard of PTSD assessment and has demonstrated excellent reliability and validity in previous research (Weathers, Keane, & Davidson, 2001). Interviews using the CAPS were conducted by trained interviewers. Interviewers presented each case in weekly diagnostic review group meetings attended by doctoral-level staff to determine consensus on whether participants met full symptom criteria for PTSD. Interviews were not rated by a second interviewer. As such, no formal assessment of inter-rater reliability is available, although Cronbach's alpha for the sum of frequency and intensity ratings for each symptom indicated high internal consistency at the baseline ($\alpha = .91$) and annual ($\alpha = .93$) time points.

Control Variables.

Time since trauma exposure. How long ago the deployment-related trauma occurred was ascertained from the CAPS interview described above.

Mental Health Treatment Involvement. Whether participants had received mental health treatment over the period between the baseline and annual assessment was assessed using the Treatment Involvement Form (unpublished measure) created for the larger study. The TIF a 23-item measure created for the larger study that assesses participants' involvement in a variety of forms of treatment, including psychiatric, psychological (e.g., individual/group therapy), and other forms of treatment (e.g., self-help group). The variables assessing whether participants had participated in individual therapy, group therapy, or seen a doctor/psychiatrist for medication management of a mental health problem were used to create a binary variable ascertaining whether participants had participated in a form of mental health treatment over the one year period.

Depression. Depression was assessed using the Beck Depression Inventory-II (BDI-II, Beck, Steer, & Brown, 1996) administered at the baseline timepoint. The BDI-II is a common 21-item measure self-report measure of a variety of depressive symptoms including sadness, pessimism, loss of pleasure, and suicidal ideation. Each item is scored on a 4-point scale ranging from 0 (*no symptoms*) to three (*severe symptoms*). All 21 items can be summed to form a total severity score, with total scores ranging from 0-63. The total score was used in the current study. The BDI-II has demonstrated excellent reliability and validity across multiple samples (Beck, Steer, Ball, & Ranieri, 1996; Grothe et al., 2005). Cronbach's alpha for the current sample was .95.

Civilian trauma. The number of civilian traumatic events was assessed using the Traumatic Life Events Questionnaire (TLEQ; Kubany, 2000). The TLEQ is a 23 item self-report measure assessing a variety of different types of traumatic experiences, such as natural disasters, assault, and motor vehicle accidents. Respondents were asked how many times the event occurred, with responses ranging from 0 (*never*) to 6 (*more than 5 times*). Items were summed to create a total score for trauma exposure. Items assessing warfare/combat exposure were removed from the total score in order to create an index of civilian trauma exposure.

Data Analysis

Prior to data analysis, data were screened for violations of normality using guidelines from Tabachnick and Fidell (2007), including examination and correction for univariate and multivariate outliers, skewness, and kurtosis. Descriptive statistics did not indicate any issues with skew, kurtosis, univariate ($z > 3.29$) or multivariate outliers. Examination of bivariate correlations between the variables of interest did not indicate any issues with multicollinearity ($r \geq .90$). Data were analyzed in a cross-lagged panel model, using analysis techniques similar to related studies (Kaniasty & Norris, 2008; King et al., 2006;). Cross-lagged panel models were tested using structural equation modeling (SEM). SEM is a type of modeling technique used to assess relationships between observed (i.e., indicator) and unobserved (i.e., latent) variables, and has seen significant growth in use within psychological research (Kline, 2011; MacCallum & Austin; 2000). SEM is advantageous in that in addition to being able to model multiple relationships between variables, SEM does not assume that variables are measured without error and incorporates measurement error into the model, unlike other statistical techniques frequently employed within the current literature (e.g., linear regression). Data were analyzed using Mplus software (version 7.4) and parameters were estimated using maximum likelihood estimation.

Maximum likelihood is a method of estimating the parameters in a statistical model and is the most common estimation method used in SEM (Brown, 2006; Kline, 2011). Maximum likelihood estimation uses an iterative procedure to find parameter estimates that “maximize the probability of observing the available data if the data were collected from the same population again” (Brown, 2006, p. 73), and has a number of advantages, including widely used goodness-of-fit indices and standard errors for parameter estimates.

Both social support and PTSD were analyzed as latent variables. Latent variables were composed of indicators created using an item parceling approach. Item parceling aggregates individual items into larger clusters and offers improved reliability of relationships between variables (Anglin, 2009; Brown, 2006). PTSD was composed of three indicators encompassing re-experiencing symptoms, avoidance symptoms, and hyperarousal symptoms, which mapped on to DSM-IV criteria (APA, 2000). Social support was also composed of three indicators encompassing support from friends and family, reception as a veteran, and general support. Paths from social support at baseline to PTSD at 1-year and PTSD at baseline to social support at 1-year were both estimated in the same model, while accounting for the shared variance between the same latent variables measured over time (e.g., PTSD at time one and PTSD at time two) as well as the shared variance between social support and PTSD at each cross-sectional time point. Error variances of corresponding indicators measured across time (e.g., reexperiencing symptoms at baseline and reexperiencing symptoms at annual) were allowed to covary given that these constructs were composed of the same items.

Model fit was evaluated by consideration of a variety of indices, including the chi-square statistic and corresponding p-value, root-mean-square error of approximation (RMSEA), standardized root-mean-square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis

index (TLI). The Bayesian Information Criterion (BIC) is a comparative measure of fit that was also reported. The BIC does not have an absolute value that indicates “good” or “bad” model fit; however, lower BIC values indicate better model fit relative to larger values. Hence, the BIC can be used to compare models to see which model is more favorable. As the chi-square statistic is negatively impacted by sample size and often rejected with larger samples, the normed chi-square (calculated by dividing the chi-square value by the model degrees of freedom) was also reported.

Acceptable model fit was determined by a number of indices, including a non-significant chi-square value, a normed chi-square value smaller than 2.0, an RMSEA smaller than .08, an SRMR smaller than .10, and a CFI and TLI greater than .90. Excellent model fit was determined by an RMSEA smaller than .05, an SRMR smaller than .08, and a CFI and TLI greater than .95. These values correspond with recommendations from previous research (Bentler 1990; Brown & Cudeck 1993; Hu & Bentler, 1999; Kline, 2011).

Results¹

Sample Characteristics and Bivariate Correlations

Sample characteristics are presented in Table 4 (see below). The sample was primarily male (66.3%), Caucasian (54.9%), and had an average age of 38.8 ($SD = 9.8$). Participants had completed an average of 14.0 years of education ($SD = 2.1$). Most of the participants were in a romantic relationship (approximately 80%). Participants’ worst combat-related trauma occurred an average of 72.7 months ($SD = 30.1$) from the baseline assessment and 33.4% of the sample was diagnosed with PTSD. Participants obtained an average total score on the CAPS of 33.0 ($SD = 27.6$).

¹ *p*-values for path coefficients reported in the Results section correspond to the standardized coefficients for those paths

Table 4

Sample Demographics at Baseline (N = 264)

Gender (male)	66.3%
Race^a	
Caucasian	54.9%
African American	36.0%
Hispanic	21.2%
Asian American	1.5%
Other	5.3%
Household Income	
\$0 - \$14,999	16.7%
\$15,000 – \$29,999	25.4%
\$30,000 – \$44,999	26.5%
\$45,000 – \$59,999	11.7%
\$60,000 or above	17.4%
Relationship Status	
Single, not dating	7.6%
Single, in relationship	15.2%
Engaged or married	64.8%
Divorced	7.6%
PTSD Diagnosis	31.4%
Age (years)	38.8 (9.8)
Years of Education	14.0 (2.1)
Time Since Trauma (months)	72.7 (30.1)
CAPS Total Score	33.0 (27.6)

Note. Numbers in parentheses represent the standard deviation. Some categories may not equal 100% due to incomplete responding.

^aPercentage is greater than 100 due to some participants marking multiple categories

Of the 264 participants assessed at baseline, 8.3% ($n = 22$) dropped out between the baseline and annual assessment. A missingness variable was created to determine whether completers differed from non-completers on baseline PTSD and social support. Independent samples t-tests comparing completers versus non-completers on baseline PDSS [$t(253) = -.43, p = .67$], PCL-M [$t(254) = .11, p = .91$], and CAPS [$t(27.69) = -.42, p = .68$] total scores found no significant differences between completers and non-completers, indicating data were likely missing at random and that maximum likelihood was an appropriate estimation method to use in structural equation modeling analyses.

Bivariate correlations along with means and standard deviations for total scores on the CAPS, PCL, and PDSS at both time points are presented in Table 5. Examination of bivariate correlations showed significant associations between all of these variables in the expected direction ($r \geq \pm .42$). In particular, there was a significant negative bivariate relationship between the PDSS total score at baseline with the PCL-M ($r = -.47, p < .001$) and CAPS total score ($r = -.46, p < .001$) at annual, along with a significant negative bivariate association between the PCL-M and CAPS total score at baseline with the PDSS at annual ($r = -.42, p < .001$ for PCL-M; $r = -.42, p < .001$ for CAPS). Correlations also showed a strong association between CAPS and PCL total scores at baseline ($r = .81, p < .001$) and annual ($r = .87, p < .001$).

Models without Control Variables

Results from the self-report model of PTSD without control variables included (using standardized coefficients) are presented in Figure 1. Examination of fit indices generally

Table 5

Intercorrelations, Means, and Standard Deviations for the PDSS, PCL-M, and CAPS Total Scores at Baseline and Annual Time Points

Measure	1	2	3	4	5	6
1. PDSS - Baseline	—					
2. PDSS - Annual	.63***	—				
3. PCL-M - Baseline	-.45***	-.42***	—			
4. PCL-M - Annual	-.47***	-.47***	.77***	—		
5. CAPS - Baseline	-.44***	-.42***	.81***	.68***	—	
6. CAPS - Annual	-.46***	-.50***	.74***	.87***	.77***	—
<i>M</i>	53.1	52.3	40.9	45.3	33.0	38.7
<i>SD</i>	10.8	11.4	18.1	21.2	27.6	30.9

Note. *** $p < .001$; PDSS = Post Deployment Social Support Scale; PCL-M = PTSD Checklist – Military Version; CAPS = Clinician Administered PTSD Scale

indicated excellent model fit, with $\chi^2(42) = 59.53, p = .04, \chi^2/df = 1.42, RMSEA = .04$ (90% C.I. = .01 - .06), CFI = .99, TLI = .99, SRMR = .03, and BIC = 15897.03. Path coefficients showed that social support at baseline was negatively associated with PTSD at one-year follow-up ($B = -.37, \beta = -.12, p = .04$). Additionally, PTSD at baseline was negatively associated with social support at one-year follow-up ($B = -.06, \beta = .15, p = .04$).

Results from the clinician assessed model of PTSD without control variables included (using standardized coefficients) are presented in Figure 2. Fit indices for this model also indicated excellent model fit, with $\chi^2(42) = 48.36, p = .23, \chi^2/df = 1.15, RMSEA = .02$ (90% C.I. = .00 - .05), CFI = 1.0, TLI = 1.0, SRMR = .03, and BIC = 17681.64. Path coefficients indicated that PTSD at baseline was negatively associated with social support at one-year follow-up ($B = -.05, \beta = -.15, p = .04$); however, social support at baseline was not significantly associated with PTSD at one-year follow-up ($B = -.33, \beta = -.06, p = .33$).

Models with Control Variables Included

In order to examine the impact of variables that may influence the relationship between social support and PTSD from baseline to annual, additional models were run with control variables entered into the CAPS and PCL models. Control variables that were examined included elapsed time since the deployment-related trauma occurred, whether participants received mental health treatment over the one year period, baseline depression, and the number of civilian traumas (assessed at baseline). Control variables were entered separately to look at the unique effects of these variables and were incorporated into the model by including a path from the control variable to PTSD and social support at the annual time point.

Self-report model of PTSD with control variables included. Results showed that elapsed time since the deployment-related trauma ($p \geq .41$), whether participants received mental

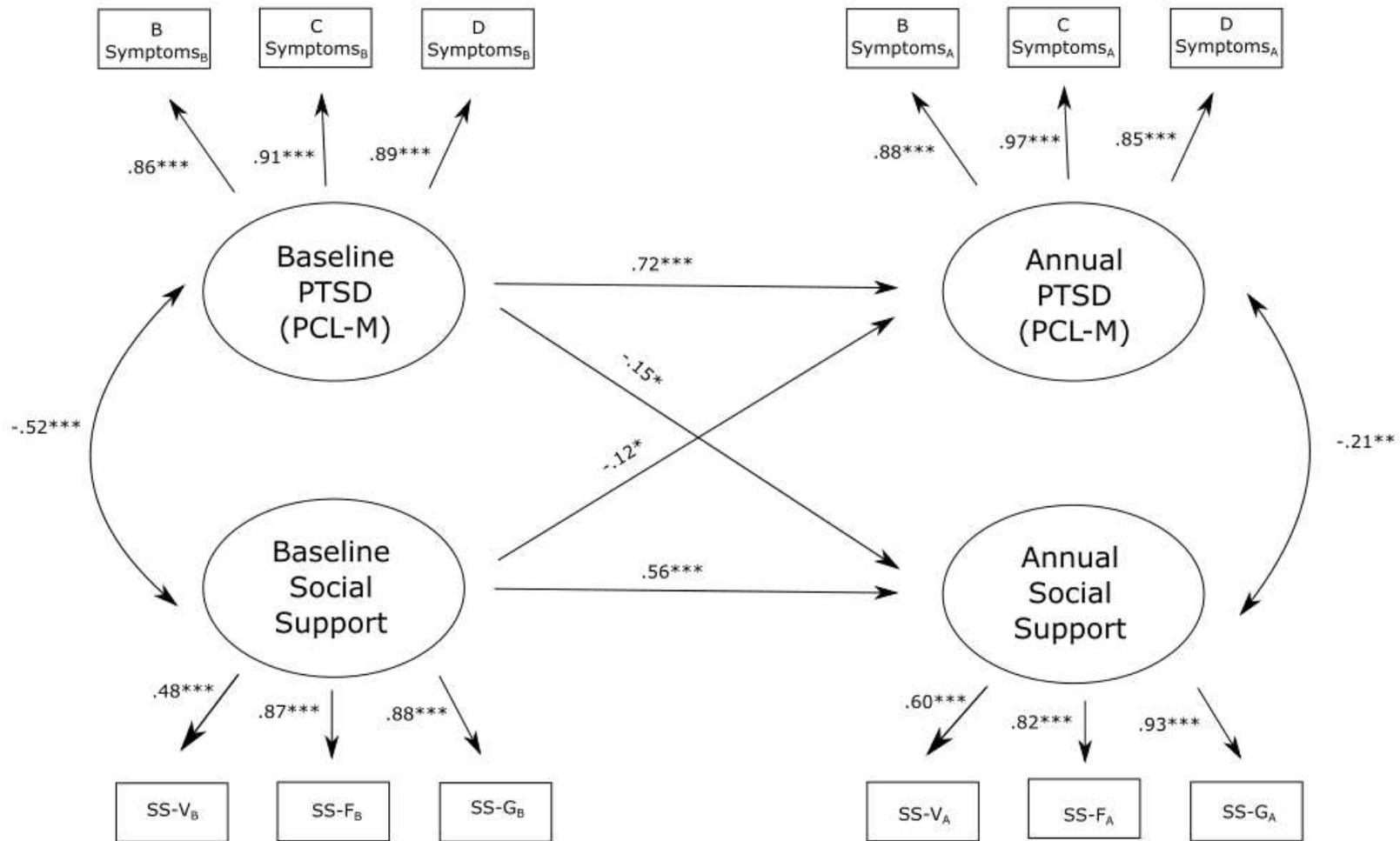


Figure 1. Simplified SEM Model of Self-Reported PTSD and Social Support from Baseline to Annual

Note. * = $p < .05$. *** = $p < .001$; paths represent standardized coefficients; PCL-M = PTSD Checklist – Military Version; SS-V = Reception as a veteran, SS-F = Support from family and friends, SS-G = General social support, B Symptoms = Reexperiencing symptoms, C Symptoms = Avoidance symptoms, D Symptoms = Hyperarousal symptoms; _B = indicators assessed at baseline; _A = indicators assessed at annual

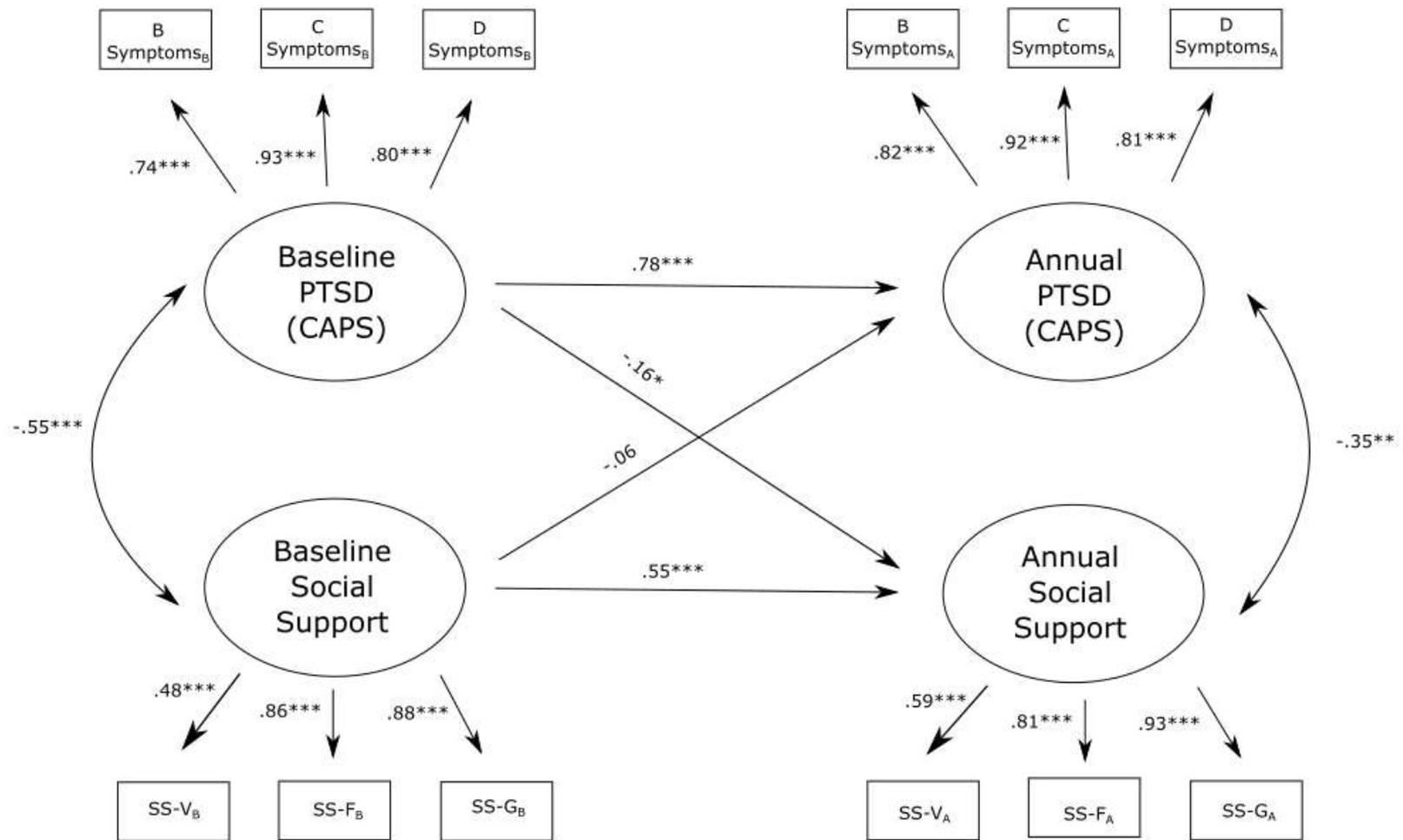


Figure 2. Simplified SEM Model of Clinician Assessed PTSD and Self-Reported Social Support from Baseline to Annual
 Note. * = $p < .05$. *** = $p < .001$; paths represent standardized coefficients; CAPS = Clinician Administered PTSD Scale; SS-V = Reception as a veteran, SS-F = Support from family and friends, SS-G = General social support, B Symptoms = Reexperiencing symptoms, C Symptoms = Avoidance symptoms, D Symptoms = Hyperarousal symptoms; _B = indicators assessed at baseline; _A = indicators assessed at annual

treatment over the one year period ($p \geq .82$), baseline depression ($p \geq .08$), and the number civilian traumas at baseline ($p \geq .10$) were not significantly related to social support or self-reported PTSD at the annual time point. Consequently, model fit indices and results for the coefficients between social support and PTSD from these models are not reported, as the results suggest that these control variables should be removed from the model in favor of the more parsimonious self-report model.

Clinician assessed model of PTSD with control variables included. As with the self-report model of PTSD, analyses for the clinician assessed model of PTSD indicated that elapsed time since the deployment-related trauma was not related to social support or clinician-assessed PTSD at annual ($p \geq .19$). Similarly, whether participants received mental health treatment over the one year period was not related to social support or clinician-assessed PTSD at annual ($p \geq .59$). As with the self-report model of PTSD, model fit indices and path coefficients between social support and PTSD from these models are not reported, as the results suggest that these variables should be removed from the model.

Baseline depression was positively related to PTSD at the annual time point ($B = .16$, $\beta = .31$, $p < .001$) but not related to social support at annual ($B = -.01$, $\beta = -.05$, $p = .60$). However, inclusion of depression as a covariate resulted in model fit indices that fell outside of the acceptable range and indicated poor model fit, with $\chi^2(52) = 274.57$, $p < .001$, $\chi^2/df = 5.28$, RMSEA = .13 (90% C.I. = .11-.14), CFI = .895, TLI = .84, SRMR = .16, and BIC = 19751.84. Because the model with depression included resulted in poor model fit, path coefficients between social support and PTSD are not reported, as fit indices suggest this model should not be retained.

Inclusion of the number of civilian traumas at baseline as a control variable showed that this variable was positively related to clinician-assessed PTSD at annual ($B = .12, \beta = .14, p = .002$). Fit indices for the model with this control variable included still indicated excellent model fit, with $\chi^2(52) = 71.38, p = .04, \chi^2/df = 1.37, RMSEA = .04$ (90% C.I. = .01 - .06), CFI = .99, TLI = .99, SRMR = .05, and BIC = 19547.71, although a chi-square difference test comparing this model to the clinician assessed model without the control variable included found the model with the control variable included resulted in a significant reduction in model fit [$\chi^2\Delta(10) = 23.02; p = .01$]. Examination of path coefficients found similar results to the clinician-assessed model without the control variable included, whereby PTSD at baseline was negatively associated with social support at annual ($B = -.05, \beta = -.16, p = .03$), but social support at baseline was not significantly associated with PTSD at annual ($B = -.24, \beta = -.05, p = .46$).

Discussion

Several theories have been proposed about how social support relates to PTSD, with some theories hypothesizing that social support plays a causal role in the development and maintenance of PTSD, whereas other theories propose that the development of PTSD results in an erosion of social support and interpersonal resources. Although several studies have noted a strong relationship between these two variables, few studies have attempted to dismantle this relationship beyond cross-sectional associations, rendering causality impossible to determine. Only a small minority of studies have attempted to explore this relationship using longitudinal data; however these studies have also suffered from a number of limitations. In particular, although many researchers acknowledge that the relationship between social support and PTSD may be bidirectional, few longitudinal studies have attempted to test for bidirectional relationships in their designs. Cross-lagged panel models allow for the testing of bidirectional

relationships but have been seldom used within this literature, and findings from the small number of studies incorporating these types of models have been mixed. When the literature is examined as a whole, findings indicates that the relationship between social support and PTSD may be more complex than simply asking *does* social support influence PTSD (or vice versa), but instead asking *under what conditions* do these variables influence one another.

Unfortunately, the majority of studies have yet to shift their attention to this more nuanced question. The purpose of the current study was to explore the directionality of the association between social support and PTSD within a one year interval in a sample of Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) veterans using cross-lagged structural equation modeling. A second aim of the study was to examine whether findings varied depending upon assessment modality, through use of a self-report measure of PTSD (i.e., the PTSD Checklist; Weathers et al., 1993) and clinician-based assessment of PTSD (i.e., the CAPS; Blake et al., 1995).

Analyses indicated excellent model fit for both the self-report and clinician assessed model of PTSD. Results found that when a self-report measure of PTSD was used, cross-lagged coefficients indicated a bi-directional relationship between PTSD and social support; social support at baseline was negatively associated with PTSD at one-year follow-up, and PTSD at baseline was negatively associated with social support at one-year follow-up. When a clinician-assessed measure of PTSD was used instead of a self-report measure, results indicated a different relationship between social support and PTSD; path coefficients showed a negative association between PTSD at baseline and social support at one-year follow-up, but no significant relationship was found between social support at baseline and PTSD at one-year follow-up.

The inclusion of control variables in the models, including the elapsed time since the occurrence of the deployment-related trauma, baseline depression, the number of civilian traumas, and whether participants received mental health treatment during the one year period appeared to have little impact upon the models that were examined. None of the control variables were significantly related to self-reported PTSD or social support at the annual time point, suggesting they should be removed from the model. In the clinician- assessed model of PTSD, the number of civilian traumas and baseline depression were both positively related to PTSD at the annual time point, although neither of these variables was related to social support at this time point. When the number of civilian traumas was incorporated into the clinician-assessed model, the cross-lagged coefficients between social support and PTSD were similar to the model without the control variable; PTSD at baseline was negatively related to social support at annual, but no relationship was found between social support at baseline and PTSD at annual. When baseline depression was incorporated into the clinician- assessed model, model fit indices fell outside of the range of acceptable values and indicated poor model fit, suggesting this model should not be retained. It is notable that these control variables did not have a significant impact upon the models, as studies have suggested that these factors may influence the directionality of the relationship between social support and PTSD. However, prior research has yet to incorporate these variables into their analyses to explicitly determine their impact (Carter et al., 2016, Fredman et al., in press; Kaniasty & Norris, 2008, King et al., 2006).

When examined altogether, results indicated consistent support in both models for PTSD as a predictor of subsequent social support. These findings fit with previous literature studying these variables using similar designs, which have also shown consistent support for this pathway (Carter et al., 2016, Fredman et al., in press; Kaniasty & Norris, 2008, King et al., 2006).

Notably, all of the previous studies using cross-lagged panel models have found evidence for social selection processes in their models, despite a number of differences in study characteristics, including the trauma sample, elapsed time since the trauma, and the time intervals between assessment points. Findings from the current study indicate that this pathway was also not affected by assessment modality, providing further evidence that this is a consistent association that is found within a variety of different contexts.

Results indicated mixed support for an association between social support and subsequent PTSD, with the model using self-reported PTSD finding a significant association between baseline social support and PTSD one year later, whereas the model using clinician-assessed PTSD did not find a significant association between these variables. The significant association found in the self-report model is notable, as the previous two studies using cross-lagged panel models (as well as self-report measures of PTSD and social support) in veteran samples did not find evidence for this pathway (Carter et al., 2016; King et al., 2006).

Although findings in the self-report model differ from past research, it is important to consider the unique characteristics and limitations of past studies. The length of time between baseline and follow-up in King and colleagues study (2006) was five years, which is a significantly longer amount of time between assessments than in the current study. Additionally, King and colleagues used different measures of social support at baseline and at follow-up, potentially resulting in discrepancies in how social support was measured over time. As findings from this study demonstrate, discrepancies between assessment measures, even in measures that assess the same construct, can affect the associations between social support and PTSD. In the study by Carter and colleagues (2016), no association was noted between social support and subsequent PTSD when examined over a six month period, but this study also differed from the

current study in several respects. First, Carter and colleagues used a sample of veterans (era unknown) with cannabis dependence who had recently attempted to quit their substance use, whereas the current study used a more broad sample of veterans. Second, social support in Carter et al.'s study was explicitly tied to support from friends, whereas the current study assessed support more broadly. Whether support from different social domains (e.g., friends vs. romantic partners) influence trauma victims in the same way has received little study within the literature, although preliminary investigations suggest that not all relationships are equivalent in how they influence trauma-related pathology (Woodward et al., 2015). These differences in methodology and study characteristics may account for discrepancies between past research and the current report and highlight the need to explore these associations within a variety of different contexts.

Findings from this study indicate that assessment modality is one factor that may be especially salient for the relationship between social support and subsequent PTSD. This finding is relevant for a number of reasons. Previous research has indicated high correspondence between self-report and clinician-assessed measures of PTSD (Bovin & Weathers, 2012; Keane, Brief, Pratt, & Miller, 2007). In line with previous research, self-reported and clinician-assessed PTSD in this study demonstrated large correlations with each other ($r = .81$ at baseline; $r = .87$ at annual). Additionally, both of these measures assessed the exact same item content, indicating that differences between the self-report and clinician-assessed models of PTSD were not due to variations in item content or wording. Results indicate that findings can vary depending on the type of assessment administered, even when high correspondence between assessment modalities is found. However, this notion is not surprising when examined within the context of the larger literature. Although previous research shows high correspondence between self-report and clinician-assessed measures of PTSD, variations in study outcomes incorporating both

assessment modalities have been found (Cody et al., 2015; Macdonald et al., 2013; Monson et al., 2008; Woodward et al., 2013). For example, Monson and colleagues (2008) examined correspondence between the PCL and CAPS for two different randomized clinical trials aimed at alleviating PTSD in veterans. Although the authors found significant correspondence between the PCL and CAPS, the PCL demonstrated more change over the course of time than the CAPS. For every one standard deviation change in PCL scores, the study found that CAPS scores changed by .75 to .82 standard deviations. The notion that assessment modality can influence findings is also salient in light of the previous studies mentioned that have used cross-lagged panel models to explore the relationship between social support and PTSD, as studies have varied in the type of assessment modalities they have used. For example, King et al (2006) used self-report measures of social support and PTSD (i.e., the PCL-M), whereas Kaniasty and Norris (2008) used a self-report measure of social support and a clinician-based measure of PTSD (i.e., Module K of the Composite International Diagnostic Interview; World Health Organization, 1997). This study indicates that differences between assessment modalities in previous studies may be one factor that has influenced the mixed results found within this literature.

Findings highlight the importance of attending to the measures that are used within these studies to explore the associations between social support and PTSD. Social support is usually assessed using self-report-based methods, whereas PTSD assessment is generally more variable with regard to whether self-report or clinician-based methods of assessment are used (Bovin & Weathers, 2012). Clinician-based measures such as the CAPS are referred to as the “gold standard” of PTSD assessment, but are more time intensive and require more in-depth training of interviewers. Self-report measures such as the PCL, one of the most widely used measures of PTSD, are more frequently employed within the literature due to the fact that they are easier to

administer, less time intensive, and generally show significant overlap with clinician based measures of PTSD (Bovin & Weathers, 2012; Keane et al., 2007). The results of this study show that although self-report and clinician-based measures may share significant overlap, they are not equivalent. Although it may require more resources, the results of this study echo previous literature comparing self-report and clinician-based measures of PTSD and other psychopathology that recommend researchers incorporate and compare both types of assessment modalities within their studies (Cuijpers, Li, Hofmann, & Andersson, 2010; Monson et al., 2008).

Findings also highlight the importance of examining the complex relationship between social support and PTSD using longitudinal data. The majority of past research exploring this association has been cross-sectional, which has severely hampered understanding of how these two variables relate. Longitudinal data also allows for testing of bidirectional relationships between social support and PTSD. Although many researchers acknowledge that the relationship between social support and PTSD may be bidirectional, few studies have utilized designs that allow for empirical testing of this hypothesis. Cross-lagged panel models incorporate bidirectional processes into their framework and allow for a more nuanced way to explore this complex association. These models have significant potential to inform both theory and clinical intervention, and are becoming increasingly utilized within the trauma literature.

The results of this study are salient in light of numerous theories concerning how interpersonal processes and PTSD interrelate. Findings provide support for both social causation and social selection theories, although social selection processes were the more consistent association within this study. This is noteworthy given that the majority of literature exploring interpersonal processes in PTSD has focused on and emphasized social causation processes in

PTSD; namely, that low social support serves as a risk factor for PTSD and high social support can be protective against PTSD. However, much of the speculation on social causation processes has come from the cross-sectional literature, which as discussed has a number of significant limitations. Notably, far fewer studies have devoted attention to exploring how PTSD may erode interpersonal resources and relationships over time. The results of this study and previous literature (Carter et al., 2016, King et al., 2006, Kaniasty & Norris, 2008,) highlight that this is a neglected but important pathway that is in need of more research and attention within the literature. What is driving the association in this study between PTSD and subsequent social support, such as caregiver burden (Zarit et al., 1986), secondary traumatization (Figley, 1989), or other factors emphasized in social selection theories of PTSD (Monson, Stevens, and Schnurr; 2004, 2006) is unknown, but results show that future studies may benefit from utilizing longitudinal designs to explore factors that account for this consistent association.

In addition to supporting proposed theory, findings also have clinical relevance. Results from both models suggest that PTSD may erode a trauma victim's social support and interpersonal resources over time. These findings are consistent with previous research finding elevated levels of relationship discord as well as higher rates of divorce for individuals with PTSD (Davidson et al., 1991; Kessler et al., 1995; Whisman et al., 2000). One possible explanation for these findings are that deficits in interpersonal functioning as a consequence of symptoms of PTSD (e.g., emotional numbing, irritability, detachment or estrangement) may push those within a trauma victim's support network away. This indicates that PTSD and trauma focused interventions may be enhanced by incorporating elements focused on improving trauma victims' interpersonal functioning. Incorporating these elements into treatment may be important irrespective of whether improvements in interpersonal functioning reduce a victim's PTSD

symptoms. A recent study by Bryant and colleagues (2015) assessing 1,035 trauma patients over time found that individuals whose PTSD had resolved after a year had poorer psychological, physical, and social functioning than those who never developed PTSD. The authors concluded that “Although many cases of PTSD remit (Morina, Wicherts, Lobbrecht, Priebe, 2014), it appears that there are functional scars from having the disorder” (p. 4). The findings from the current study along with Bryant et al. (2015), suggest that trauma interventions need to broaden their focus beyond reducing symptoms of PTSD and put greater emphasis on improving functioning and quality of life. Reduction of PTSD symptoms has been the marker by which the utility of trauma interventions have traditionally been judged. Although this is an important criterion, the results of the current study and previous literature indicate that this should not be the sole focus of trauma treatments. Although mainstream interventions for PTSD have great efficacy in reducing trauma symptoms (Chard, Schuster, & Resick, 2012; Nayak, Powers, & Foa, 2012), trauma victims may still be experiencing poor interpersonal functioning even after their symptoms dissipate, potentially due to the alienation of individuals within their interpersonal network or social isolation (Bryant et al., 2015). Greater attention is needed on improving trauma victims’ functioning across multiple domains, including interpersonal functioning, and incorporating these elements into mainstream interventions for PTSD.

The differences found between the self-report and clinician-assessed models of PTSD also have significant clinical implications. What participants were rating as PTSD was predicted by self-reported social support, whereas what clinicians were rating as PTSD was not predicted by self-reported social support. This suggests that participants and clinicians had different perspectives on PTSD symptomology, and that these differences in perspectives then influenced the relationships examined. Unfortunately, it is difficult to interpret what these differences in

perspective mean, as although studies have found discrepancies when self-report and clinician-based measures of PTSD are compared (Cody et al., 2015; Macdonald et al., 2013; Monson et al., 2008; Woodward et al., 2013), no studies have attempted to explicitly identify what accounts for the differences between these two assessment modalities. When differences are found, it is often presumed that self-report measures of PTSD may be less accurate indicators of PTSD symptomology, potentially due to client over-endorsement and high levels of general distress. Similarly, clinician-assessed measures of PTSD are frequently viewed as more accurate measures of PTSD symptomology compared to self-report-based methods due the assumption that clinicians are better able to parse out and categorize various mental health symptoms. Although it is possible that clinicians, due to greater training and knowledge of mental health symptoms, are better able to assess symptoms of PTSD, this assumption has not actually been demonstrated in the literature, as this would require that both types of assessments be compared to an external criterion. Additionally, even if it was shown that clinicians more accurately rated clients' PTSD symptoms, that does not indicate that clients' assessments should be discounted in favor of the clinician's, or that clients' reports do not have clinical value. As an example, Clements, Murphy, Eisen, and Normand (2006) examined the ability of self-report and clinician-assessed measures of patient functioning in predicting hospital readmission one year later in 1034 patients in an inpatient unit. The authors found that the self-report measure of functioning was better at predicting hospital readmission than the clinician measure of functioning and concluded that because hospital readmission is largely driven by a client's own feelings, the client's report of their functioning was likely a more salient indicator of readmission. They also found that the predictive ability of both measures combined was better than either measure alone, suggesting that the combined perspectives of client and clinician may be more valuable than

either alone. This study serves as an example that clients' perspectives may have significance even if it is possible they are less objective compared to clinicians. The results from this study also indicate that additional work is needed to examine what accounts for discordance between self-report and clinician-based assessment of PTSD symptomology. Insight into these discrepancies may help explain what is influencing differences between self-report and clinician-based outcomes in this and other studies (Cody et al., 2015; Macdonald et al., 2013; Monson et al., 2008; Woodward et al., 2013).

Findings from this study shed additional light on the complex relationship between social support and PTSD; however, some limitations should be noted. Although this study improves upon previous investigations through the use of longitudinal data, only two time points were examined. Additional time points would have provided a broader picture of the relationship between social support and PTSD over time and highlighted how these associations may change over time. Another limitation within the current study is that the elapsed time since the deployment-related trauma for this sample occurred a relatively long time ago ($M = 72.7$ months, $SD = 30.1$). Although time since the deployment-related trauma did not have any significant impact upon the models in this study, findings suggest that individuals reporting symptoms within this study were likely suffering from chronic PTSD symptoms. Prolonged levels of PTSD may put a significant amount of strain on those within a trauma victim's support network, resulting in a dynamic between PTSD and social support that may be distinct when compared to individuals who have only recently experienced a trauma. This points to the need for more studies that examine these models within recently traumatized samples, a time period which has been understudied within this literature. In particular, very few studies have examined the impact of social support *prior* to a trauma on post-trauma symptomology. Studies utilizing this type of

design may be particularly suited to determining whether interpersonal processes serve as a risk and protective factor in the etiology of PTSD. This also emphasizes the need for studies examining these relationships to report how long ago participants' traumas occurred, an important piece of information that is frequently either not assessed or left out of many studies highlighted previously. Relevant information such as this will likely provide greater insight into interpreting the relationships that are either established or non-existent within various studies. A final limitation is that because social support was assessed as a general construct, results do not delineate what specific aspects of social support were salient, such as whether it was positive or negative support that was driving the associations found in this study. This distinction is notable, as positive and negative support are thought to relate to PTSD in separate ways, resulting in a different set of clinical implications depending upon whether associations are found with positive or negative support. This limitation is also relevant given that studies have found different associations when comparing positive and negative support behaviors (Woodward & Beck, in press; Wu, Chen, Weng, & Wu, 2009). This highlights a larger issue within the literature of how to define and examine social support. As discussed in the introduction, social support has been operationalized across studies in a variety of ways, such as instrumental/emotional support, positive/negative support, and support from different types of relationships. The complexity of defining social support has contributed to ambiguity in this literature, in part because few studies have attempted to compare the influence of various types of support on trauma outcomes. More work is needed to understand the differential effects of various types of social support and how they may uniquely relate to PTSD and other trauma sequelae, such as comparing the unique contributions of positive and negative support in the types of designs used in this study.

Taken as a whole, there are number of factors that researchers should consider when examining the relationship between social support and PTSD within these models, including the trauma sample used, how long ago the trauma occurred, and the time interval between points of assessment. Results from this study show that another important factor that should also be attended to is assessment modality. Studies utilizing cross-lagged panel designs to explore the relationship between PTSD and social support are becoming more frequent in the literature, but this literature is still in its infancy. Additional studies are needed to further understand how these factors influence the relationship between PTSD and social support. When the literature is examined as a whole, findings indicates that the relationship between social support and PTSD is more complex than simply asking *does* social support influence PTSD (or vice versa), but instead asking *under what conditions* these variables influence one another, a question that studies have yet to shift their attention to. This study begins that process and provides a foundation from which future studies can build.

References

- American Psychiatric Association. (2000) *Diagnostic and statistical manual of mental disorders* (Revised 4th ed.) Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Anglin, J. (September 26, 2009). *Item parcelling in confirmatory factor analysis*. Retrieved from <http://jeromyanglim.blogspot.com/2009/09/item-parcelling-in-confirmatory-factor.html>
- Arnberg, F. K., Hultman, C. M., Michel, P., & Lundin, T. (2012). Social support moderates posttraumatic stress and general distress after disaster. *Journal of Traumatic Stress, 25*(6), 721-727. doi:10.1002/jts.21758
- Banks, D. M., & Weems, C. F. (2014). Family and peer social support and their links to psychological distress among hurricane-exposed minority youth. *American Journal of Orthopsychiatry, 84*(4), 341-352. doi:10.1037/ort0000006
- Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. F. (1996). Comparison of Beck Depression Inventories–IA and –II in psychiatric outpatients. *Journal of Personality Assessment, 67*(3), 588-597. doi:10.1207/s15327752jpa6703_13
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory manual* (2nd ed.). San Antonio, TX: Psychological Corporation.
- Beck, J. G., Grant, D. M., Clapp, J. D., & Palyo, S. A. (2009). Understanding the interpersonal impact of trauma: Contributions of PTSD and depression. *Journal of Anxiety Disorders, 23*(4), 443-450. doi:10.1016/j.janxdis.2008.09.001
- Belsher, B. E., Ruzek, J. I., Bongar, B., & Cordova, M. J. (2012). Social constraints, posttraumatic cognitions, and posttraumatic stress disorder in treatment-seeking trauma survivors: Evidence for a social-cognitive processing model. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*(4), 386-391. doi:10.1037/a0024362
- Bentler, P. M. (1980). Multivariate analysis with latent variables: Causal modeling. *Annual Review of Psychology, 31*419-456. doi:10.1146/annurev.ps.31.020180.002223
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246. doi:10.1037/0033-2909.107.2.238
- Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a Clinician-Administered PTSD Scale. *Journal of Traumatic Stress, 8*(1), 75-90. doi:10.1002/jts.2490080106

- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD checklist (PCL). *Behaviour Research and Therapy*, 34(8), 669-673. doi:10.1016/0005-7967(96)00033-2
- Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation approach*. Hoboken, NJ: Wiley.
- Boss, P. (2007). Ambiguous loss theory: Challenges for scholars and practitioners. *Family Relations*, 56, 105-111.
- Bovin, M. J., & Weathers, F. W. (2012). Assessing PTSD symptoms. In J. G. Beck & D. M. Sloan (Eds.), *The Oxford handbook of traumatic stress disorders* (pp. 235-249). New York, NY, US: Oxford University Press. doi:10.1093/oxfordhb/9780195399066.013.0016
- Breslau, N. (2012). Epidemiology of posttraumatic stress disorder in adults. In J. G. Beck, D. M. Sloan, J. G. Beck, D. M. Sloan (Eds.), *The Oxford handbook of traumatic stress disorders* (pp. 84-97). New York, NY, US: Oxford University Press. doi:10.1093/oxfordhb/9780195399066.013.0007
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68(5), 748-766.
- Brown, M.W., & Cudeck, R. (1993). Alternate ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models*. Newbury Park, CA: Sage.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY, US: Guilford Press.
- Bryant, R. A., McFarlane, A. C., Silove, D., O'Donnell, M. L., Forbes, D., & Creamer, M. (2015). The lingering impact of resolved PTSD on subsequent functioning. *Clinical Psychological Science*, 1-4. doi: 10.1177/2167702615598756
- Bryant-Davis, T., Ullman, S., Tsong, Y., Anderson, G., Counts, P., Tillman, S., & ... Gray, A. (2015). Healing pathways: Longitudinal effects of religious coping and social support on PTSD symptoms in African American sexual assault survivors. *Journal of Trauma & Dissociation*, 16(1), 114-128. doi:10.1080/15299732.2014.969468
- Carroll, E. M., Rueger, D. B., Foy, D. W., & Donahoe, C. P. (1985). Vietnam combat veterans with Posttraumatic Stress Disorder: Analysis of marital and cohabitating adjustment. *Journal of Abnormal Psychology*, 94(3), 329-337. doi:10.1037/0021-843X.94.3.329

- Carter, S. P., DiMauro, J., Renshaw, K. D., Curby, T. W., Babson, K. A., & Bonn-Miller, M. O. (2016). Longitudinal associations of friend-based social support and PTSD symptomatology during a cannabis cessation attempt. *Journal of Anxiety Disorders, 38*, 62-67. doi: 10.1016/j.janxdis.2016.01.008
- Chard, K. M., Schuster, J. L., & Resick, P. A. (2012). Empirically supported psychological treatments: Cognitive processing therapy. In J. G. Beck & D. M. Sloan (Eds.), *The Oxford handbook of traumatic stress disorders* (pp. 439-448). New York, NY, US: Oxford University Press.
- Charuvastra, A., & Cloitre, M. (2008). Social bonds and posttraumatic stress disorder. *Annual Review of Psychology, 59*, 301-328. doi:10.1146/annurev.psych.58.110405.085650
- Clapp, J. D., & Beck, J. G. (2009). Understanding the relationship between PTSD and social support: The role of negative network orientation. *Behaviour Research and Therapy, 47*(3), 237-244. doi:10.1016/j.brat.2008.12.006
- Clements, K. M., Murphy, J. M., Eisen, S. V., & Normand, S. T. (2006). Comparison of self-report and clinician-rated measures of psychiatric symptoms and functioning in predicting 1-year hospital readmission. *Administration and Policy in Mental Health and Mental Health Services Research, 33*(5), 568-577. doi:10.1007/s10488-006-0066-y
- Cody, M. W., Jones, J. M., Woodward, M. J., Simmons, C. A., & Beck, J. G. (2015). Correspondence between self-report measures and clinician assessments of psychopathology in female intimate partner violence survivors: A receiver operating characteristics analysis. *Journal of Interpersonal Violence*. doi: 10.1177/0886260515589566
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310-357. doi:10.1037/0033-2909.98.2.310
- Cruwys, T., Haslam, S. A., Dingle, G. A., Haslam, C., & Jetten, J. (2014). Depression and social identity: An integrative review. *Personality and Social Psychology Review, 18*(3), 215-238. doi:10.1177/1088868314523839
- Cuijpers, P., Li, J., Hofmann, S. G., & Andersson, G. (2010). Self-reported versus clinician-rated symptoms of depression as outcome measures in psychotherapy research on depression: A meta-analysis. *Clinical Psychology Review, 30*(6), 768-778. doi:10.1016/j.cpr.2010.06.001
- Davidson, J. R., Hughes, D., Blazer, D. G., & George, L. K. (1991). Post-traumatic stress disorder in the community: An epidemiological study. *Psychological Medicine, 21*(3), 713-721. doi:10.1017/S0033291700022352

- DePrince, A. P., Welton-Mitchell, C., & Srinivas, T. (2014). Longitudinal predictors of women's experiences of social reactions following intimate partner abuse. *Journal of Interpersonal Violence, 29*(13), 2509-2523. doi:10.1177/0886260513520469
- Deykin, E. Y., Keane, T. M., Kaloupek, D., Fincke, G., Rothendler, J., Siegreid, M., et al. (2001). Post-traumatic stress disorder and the use of health services. *Psychomatic Medicine, 63*, 835-841.
- Dirkwager, A. E., Bramsen, I., & van der Ploeg, H. M. (2003). Social support, coping, life events, and posttraumatic stress symptoms among former peacekeepers: A prospective study. *Personality and Individual Differences, 34*(8), 1545-1559. doi:10.1016/S0191-8869(02)00198-8
- Dormann, C., & Griffin, M. A. (2015). Optimal time lags in panel studies. *Psychological Methods, 20*(4), 489-505. doi:10.1037/met0000041
- Dunmore, E., Clark, D. M., & Ehlers, A. (1999). Cognitive factors involved in the onset and maintenance of posttraumatic stress disorder (PTSD) after physical or sexual assault. *Behaviour Research and Therapy, 37*(9), 809-829. doi:10.1016/S0005-7967(98)00181-8
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy, 38*, 319-345. doi: 10.1016/S0005-7967(99)00123-0
- Erbes, C. R., Meis, L. A., Polusny, M. A., & Compton, J. S. (2011). Couple adjustment and posttraumatic stress disorder symptoms in National Guard veterans of the Iraq war. *Journal of Family Psychology, 25*(4), 479-487. doi:10.1037/a0024007
- Figley, C. R. (1989). *Helping traumatized families*. San Francisco, CA: Jossey-Bass.
- Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): Development and validation. *Psychological Assessment, 11*, 303-314. doi: 10.1037/1040-3590.11.3.303
- Fredman, S. J., Beck, J. G., Shnaider, P., Le, Y., Pukay-Martin, N., Pentel, K. Z., ... & N. M., Marques (2016). Longitudinal association between PTSD symptoms and dyadic conflict communication following a severe motor vehicle accident. *Behavior Therapy*, in press.
- Fredman, S. J., Vorstenbosch, V., Wagner, A. C., Macdonald, A., & Monson, C. M. (2014). Partner accommodation in posttraumatic stress disorder: Initial testing of the Significant Others' Responses to Trauma Scale (SORTS). *Journal of Anxiety Disorders, 28*(4), 372-381. doi:10.1016/j.janxdis.2014.04.001
- Grothe, K. B., Gareth, R., Jones, G.N., Bodenlos, J., Ancona, M., & Brantley, P. J. (2005). Validation of the Beck Depression Inventory-II in a low-income African American sample of medical outpatients. *Psychological Assessment, 17*(1), 110-114. doi:10.1037/1040-3590.17.1.110

- Hall, B. J., Bonanno, G. A., Bolton, P. A., & Bass, J. K. (2014). A longitudinal investigation of changes to social resources associated with psychological distress among Kurdish torture survivors living in Northern Iraq. *Journal of Traumatic Stress, 27*(4), 446-453. doi:10.1002/jts.21930
- Hobfoll, S. E. (1988). *The ecology of stress*. Washington, DC: Hemisphere.
- Holeva, V., Tarrier, N., & Wells, A. (2001). Prevalence and predictors of acute stress disorder and PTSD following road traffic accidents: Thought control strategies and social support. *Behavior Therapy, 32*(1), 65-83. doi:10.1016/S0005-7894(01)80044-7
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. doi:10.1080/10705519909540118
- Joseph, S., Williams, R., & Yule, W. (1997). *Understanding posttraumatic stress: A psychosocial perspective on PTSD and treatment*. Chichester, UK: Wiley.
- Kaniasty, K. (2005). Social support and traumatic stress. *PTSD Research Quarterly, 16*(2), 1-8. Retrieved from <http://www.ptsd.va.gov/professional/newsletters/research-quarterly/V16N2.pdf>
- Kaniasty, K., & Norris, F. H. (1992). Social support and victims of crime: Matching event, support, and outcome. *American Journal of Community Psychology, 20*(2), 211-241. doi:10.1007/BF00940837
- Kaniasty, K., & Norris, F. H. (1993). A test of the social support deterioration model in the context of natural disaster. *Journal of Personality and Social Psychology, 64*(3), 395-408. doi:10.1037/0022-3514.64.3.395
- Kaniasty, K., & Norris, F. H. (2008). Longitudinal linkages between perceived social support and posttraumatic stress symptoms: Sequential roles of social causation and social selection. *Journal of Traumatic Stress, 21*(3), 274-281. doi:10.1002/jts.20334
- Kazdin, A. E. (2003). *Research design in clinical psychology (4th ed.)*. Boston, MA, US: Allyn & Bacon.
- Keane, T. M., Brief, D. J., Pratt, E. M., & Miller, M. W. (2007). Assessment of PTSD and its comorbidities in adults. In M. J. Friedman, T. M. Keane, & P. A. Resick, (Eds.), *Handbook of PTSD: Science and practice* (pp. 279-305). New York, NY, US: Guilford Press.
- Keane, T. M., Scott, W. O, Chavoya, G. A., Lamparski, D. M., & Fairbank, J. A. (1985). Social support in Vietnam veterans with posttraumatic stress disorder: A comparative analysis. *Journal of Consulting and Clinical Psychology, 53*, 95-102.

- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 593-602. doi:10.1001/archpsyc.62.6.593
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, *52*(12), 1048-1060.
- King, D. W., King, L. A., Foy, D. W., Keane, T. M., & Fairbank, J. A. (1999). Posttraumatic stress disorder in a national sample of female and male Vietnam veterans: Risk factors, war-zone stressors, and resilience-recovery variables. *Journal of Abnormal Psychology*, *108*(1), 164-170.
- King, D. W., King, L. A., & Vogt, D. S. (2003). Manual for the Deployment Risk and Resilience Inventory (DRRI): A collection of scales for studying deployment-related experiences in military veterans. Boston, MA: National Center for PTSD.
- King, L. A., King, D. W., Vogt, D. S., Knight, J., & Samper, R. E. (2006). Deployment Risk and Resilience Inventory: A collection of measures for studying deployment-related experiences of military personnel and veterans. *Military Psychology*, *18*(2), 89-120. doi:10.1207/s15327876mp1802_1
- King, D. W., Leskin, G. A., King, L. A., & Weathers, F. W. (1998). Confirmatory factor analysis of the clinician-administered PTSD Scale: Evidence for the dimensionality of posttraumatic stress disorder. *Psychological Assessment*, *10*(2), 90-96. doi:10.1037/1040-3590.10.2.90
- King, D. W., Taft, C., King, L. A., Hammond, C., & Stone, E. R. (2006). Directionality of the association between social support and posttraumatic stress disorder: A longitudinal investigation. *Journal of Applied Social Psychology*, *36*(12), 2980-2992. doi:10.1111/j.0021-9029.2006.00138.x
- Kline, R. B. (2011). *Principles and practice of structural equation modeling (3rd ed.)*. New York, NY, US: Guilford Press.
- Koenen, K. C., Stellman, J. M., Stellman, S. D., & Sommer, J. J. (2003). Risk factors for course of posttraumatic stress disorder among Vietnam veterans: A 14-year follow-up of American Legionnaires. *Journal of Consulting and Clinical Psychology*, *71*(6), 980-986. doi:10.1037/0022-006X.71.6.980
- Kubany, E. S., Leisen, M. B., Kaplan, A. S., Watson, S. B., Haynes, S. N., Owens, J. A., & Burns, K. (2000). Development and preliminary validation of a brief broad-spectrum measure of trauma exposure: The Traumatic Life Events Questionnaire. *Psychological Assessment*, *12*(2), 210-224. doi:10.1037/1040-3590.12.2.210

- La Greca, A. M., Silverman, W. K., Vernberg, E. M., & Prinstein, M. J. (1996). Symptoms of posttraumatic stress in children after Hurricane Andrew: A prospective study. *Journal of Consulting and Clinical Psychology, 64*(4), 712-723. doi:10.1037/0022-006X.64.4.712
- Lepore, S. (2001). A social-cognitive processing model of emotional adjustment to cancer. In A. Baum & B. L. Anderson (Eds.), *Psychosocial interventions for cancer* (pp. 99–116). Washington, DC: American Psychological Association.
- Lepore, S. J., Fernandez-Berrocal, P., Ragan, J., & Ramos, N. (2004). It's not that bad: Social challenges to emotional disclosure enhance adjustment to stress. *Anxiety, Stress & Coping: An International Journal, 17*(4), 341-361. doi:10.1080/10615800412331318625
- Lepore, S. J., Ragan, J. D., & Jones, S. (2000). Talking facilitates cognitive–emotional processes of adaptation to an acute stressor. *Journal of Personality and Social Psychology, 78*(3), 499-508. doi:10.1037/0022-3514.78.3.499
- Lepore, S. J., Fernandez-Berrocal, P., Ragan, J., & Ramos, N. (2004). It's not that bad: Social challenges to emotional disclosure enhance adjustment to stress. *Anxiety, Stress & Coping: An International Journal, 17*(4), 341-361. doi:10.1080/10615800412331318625.
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51*201-226. doi:10.1146/annurev.psych.51.1.201
- Macdonald, A., Greene, C. J., Torres, J. G., Frueh, B. C., & Morland, L. A. (2013). Concordance between clinician-assessed and self-reported symptoms of posttraumatic stress disorder across three ethnorracial groups. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*(5), 401-408. doi:10.1037/a0027313
- Monson, C. M., Fredman, S. J., & Dekel, R. (2010). Posttraumatic stress disorder in an interpersonal context. In J. G. Beck (Ed.), *Interpersonal processes in the anxiety disorders: Implications for understanding psychopathology and treatment* (pp. 179-208). Washington, DC, US: American Psychological Association. doi:10.1037/12084-007
- Monson, C. M., Gradus, J. L., Young-Xu, Y., Schnurr, P. P., Price, J. L., & Schumm, J. A. (2008). Change in posttraumatic stress disorder symptoms: Do clinicians and patients agree? *Psychological Assessment, 20*(2), 131-138. doi:10.1037/1040-3590.20.2.131
- Monson, C. M., Schnurr, P. P., Stevens, S. P., & Guthrie, K. A. (2004). Cognitive-behavioral couple's treatment for posttraumatic stress disorder: Initial findings. *Journal of Traumatic Stress, 17*(4), 341-344. doi:10.1023/B:JOTS.0000038483.69570.5b
- Monson, C. M., Stevens, S. P., & Schnurr, P. P. (2005). Cognitive-Behavioral Couple's Treatment for Posttraumatic Stress Disorder. In T. A. Corales (Ed.), *Focus on posttraumatic stress disorder research* (pp. 245-274). Hauppauge, NY, US: Nova Science Publishers.

- Monson, C. M., Stevens, S. P., & Schnurr, P. P. (2006). Kognitive Verhaltenstherapie für Paare [Cognitive-behavioral couple's treatment for posttraumatic stress disorder]. In R. Rosner & A. Maercker (Eds.), *Psychotherapie der posttraumatischen Belastungsstörungen* (pp. 102-115). Munich, Germany: Thieme.
- Monson, C. M., Taft, C. T., & Fredman, S. J. (2009). Military-related PTSD and intimate relationships: From description to theory-driven research and intervention development. *Clinical Psychology Review, 29*(8), 707-714. doi:10.1016/j.cpr.2009.09.002
- Morina, N., Wicherts, J. M., Lobbrecht, J., & Priebe, S. (2014). Remission from post-traumatic stress disorder in adults: A systematic review and meta-analysis of long term outcome studies. *Clinical Psychology Review, 34*(3), 249-255. doi:10.1016/j.cpr.2014.03.002
- Nayak, N., Powers, M. B., & Foa, E. B. (2012). Empirically supported psychological treatments: Prolonged exposure. In J. G. Beck & D. M. Sloan, (Eds.), *The Oxford handbook of traumatic stress disorders* (pp. 427-438). New York, NY, US: Oxford University Press.
- Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60*(3), 409-418.
- Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology, 71*(3), 498-511. doi:10.1037/0022-3514.71.3.498
- Olatunji, B. O., Cisler, J. M., & Tolin, D. F. (2007). Quality of life in the anxiety disorders: A meta-analytic review. *Clinical Psychology Review, 27*, 572-581. doi:10.1176/appi.ps.59.3.268
- Ozer, E., Best, S., Lipsey, T., & Weiss, D. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*(1), 52-73.
- Price, M., Gros, D. F., Strachan, M., Ruggiero, K. J., & Acierno, R. (2013). The role of social support in exposure therapy for Operation Iraqi Freedom/Operation Enduring Freedom veterans: A preliminary investigation. *Psychological Trauma: Theory, Research, Practice, And Policy, 5*(1), 93-100. doi:10.1037/a0026244
- Punamäki, R., Komproe, I., Qouta, S., El-Masri, M., & de Jong, J. M. (2005). The deterioration and mobilization effects of trauma on social support: Childhood maltreatment and adulthood military violence in a Palestinian community sample. *Child Abuse & Neglect, 29*(4), 351-373. doi:10.1016/j.chiabu.2004.10.011
- Ramchand, R., Marshall, G. N., Schell, T. L., & Jaycox, L. H. (2008). Posttraumatic distress and physical functioning: A longitudinal study of injured survivors of community violence. *Journal of Consulting and Clinical Psychology, 76*(4), 668-676. doi:10.1037/0022-006X.76.4.668

- Ren, X. S., Skinner, K., Lee, A., & Kazis, L. (1999). Social support, social selection and self-assessed health status: Results from the veterans health study in the United States. *Social Science & Medicine*, 48(12), 1721-1734. doi:10.1016/S0277-9536(99)00069-6
- Resnick, H. S., Kilpatrick, D. G., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology*, 61(6), 984-991.
- Riggs, D. S., Byrne, C. A., Weathers, F. W., & Litz, B. T. (1998). The quality of the intimate relationships of male Vietnam veterans: Problems associated with posttraumatic stress disorder. *Journal of Traumatic Stress*, 11(1), 87-101. doi:10.1023/A:1024409200155
- Robinaugh, D. J., Marques, L., Traeger, L. N., Marks, E. H., Sung, S. C., Gayle Beck, J., ... & Simon, N. M. (2011). Understanding the relationship of perceived social support to post-trauma cognitions and posttraumatic stress disorder. *Journal of Anxiety Disorders*, 25(8), 1072-1078. doi:10.1016/j.janxdis.2011.07.004
- Salazar, L. F., Wingood, G. M., DiClemente, R. J., Lang, D. L., & Harrington, K. (2004). The role of social support in the psychological well-being of African American girls who experience dating violence victimization. *Violence and Victims*, 19(2), 171-187. doi:10.1891/vivi.19.2.171.64100
- Schnurr, P. P., Hayes, A. F., Lunney, C. A., McFall, M. & Uddo, M. (2006). Longitudinal analysis of the relationship between symptoms and quality of life in veterans treated for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, 74, 707-713. doi:10.1037/002-06-X.74.4.707
- Selig, J. P., & Little, T. D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T. D. Little, & N. A. Card (Eds.), *Handbook of developmental research methods* (pp. 265-278). New York, NY, US: Guilford Press.
- Solomon, Z., & Mikulincer, M. (1990). Life events and combat-related posttraumatic stress disorder: The intervening role of locus of control and social support. *Military Psychology*, 2, 241-256.
- Stavrakakis, N., de Jonge, P., Ormel, J., & Oldehinkel, A. J. (2012). Bidirectional prospective associations between physical activity and depressive symptoms. The TRAILS Study. *Journal of Adolescent Health*, 50(5), 503-508. doi:10.1016/j.jadohealth.2011.09.004
- Suvak, M., Maguen, S., Litz, B. T., Silver, R. C., & Holman, E. A. (2008). Indirect exposure to the September 11 terrorist attacks: Does symptom structure resemble PTSD? *Journal of Traumatic Stress*, 21(1), 30-39. doi:10.1002/jts.20289
- Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics (5th ed.)*. Boston, MA: Allyn & Bacon/Pearson Education.

- Taft, C. T., Stern, A. S., King, L. A., & King, D. W. (1999). Modeling physical health and functional health status: The role of combat exposure, posttraumatic stress disorder and personal resource attributes. *Journal of Traumatic Stress, 12*(1), 3-23. doi:10.1023/A:1024786030358
- Thrasher, S., Power, M., Morant, N., Marks, I., & Dalglish, T. (2010). Social support moderates outcomes in a randomized controlled trial of exposure therapy and (or) cognitive restructuring for chronic posttraumatic stress disorder. *The Canadian Journal of Psychiatry / La Revue Canadienne De Psychiatrie, 55*(3), 187-190.
- Ullman, S. E., & Filipas, H. H. (2001). Predictors of PTSD symptom severity and social reactions in sexual assault victims. *Journal of Traumatic Stress, 14*(2), 369-389. doi:10.1023/A:1011125220522
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, October). The PTSD Checklist: Reliability, validity, and diagnostic utility. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.
- Wade, T. D., & Kendler, K. S. (2000). The relationship between social support and major depression: Cross-sectional, longitudinal, and genetic perspectives. *Journal of Nervous and Mental Disease, 188*(5), 251-258. doi:10.1097/00005053-200005000-00001
- Weathers, F. W., Keane, T. M., & Davidson, J. R. (2001). Clinician-administered PTSD scale: A review of the first ten years of research. *Depression and Anxiety, 13*, 132-156.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (October 1993). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Presentation at the annual conference of the International Society for Traumatic Stress Studies; San Antonio, Texas.
- Whisman, M. A., Sheldon, C. T., & Goering, P. (2000). Psychiatric disorders and dissatisfaction with social relationships: Does type of relationship matter? *Journal of Abnormal Psychology, 109*(4), 803-808. doi:10.1037/0021-843X.109.4.803
- Woodward, M. J., & Beck, J. G. (in press). Using the trauma film paradigm to explore interpersonal processes after trauma exposure. *Psychological Trauma: Theory, Research, Practice, & Policy*.
- Woodward, M. J., Eddinger, J., Henschel, A. V., Dodson, T. S., Tran, H. N., & Beck, J. G. (2015). Social support, posttraumatic cognitions, and PTSD: The influence of family, friends, and a close other in an interpersonal and non-interpersonal trauma group. *Journal of Anxiety Disorders, 35*, 60-67. doi: 10.106/j.janxdis.2015.09.002

- Woodward, M. J., Patton, S., McNiff, J., Olsen, S., Reich, C. M., Blackwell, N., & Beck, J. G. (2013). How do attachment style and social support contribute to women's psychopathology following intimate partner violence? Examining clinician ratings versus self-report. *Journal of Anxiety Disorders*, 27(3), 312-320. doi: 10.1016/j.janxdis.2013.02.007
- World Health Organization. (1997). Composite International Diagnostic Interview (CIDI) (Version 2.1). Geneva, Switzerland: Author.
- Wu, C., Chen, S., Weng, L., & Wu, Y. (2009). Social relations and PTSD symptoms: A prospective study on earthquake-impacted adolescents in Taiwan. *Journal of Traumatic Stress*, 22(5), 451-459. doi:10.1002/jts.20447
- Yuan, C., Wang, Z., Inslicht, S. S., McCaslin, S. E., Metzler, T. J., Henn-Haase, C., & ... Marmar, C. R. (2011). Protective factors for posttraumatic stress disorder symptoms in a prospective study of police officers. *Psychiatry Research*, 188(1), 45-50. doi:10.1016/j.psychres.2010.10.034
- Zarit, S. H., Todd, P. A., & Zarit, J. M. (1986). Subjective burden of husbands and wives as caregivers: A longitudinal study. *The Gerontologist*, 26(3), 260-266. doi:10.1093/geront/26.3.260
- Zoellner, L. A., Foa, E. B., & Brigidi, B. D. (1999). Interpersonal friction and PTSD in female victims of sexual and nonsexual assault. *Journal of Traumatic Stress*, 12(4), 689-700.