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THE ASSOCIATIONS AMONG EXPRESSED EMOTION, RELATIONSHIP SATISFACTION, PTSD SYMPTOMS, ALCOHOL USE, AND DEPRESSION: A LONGITUDINAL INVESTIGATION WITH A MILITARY SAMPLE

by

Laci Lee Zawilinski

A Dissertation Submitted to the Graduate School and the Department of Psychology at The University of Southern Mississippi in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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August 2016
ABSTRACT

THE ASSOCIATIONS AMONG EXPRESSED EMOTION, RELATIONSHIP SATISFACTION, PTSD SYMPTOMS, ALCOHOL USE, AND DEPRESSION: A LONGITUDINAL INVESTIGATION WITH A MILITARY SAMPLE

by Laci Lee Zawilinski

August 2016

PTSD in military personnel is highly prevalent and accompanied by elevated rates of additional issues such as depression, problematic alcohol use, and interpersonal relationship problems. Family members and spouses of military personnel have also been shown to be negatively impacted by PTSD symptoms. Previous research has indicated that family members and spouses’ expressed emotion regarding the PTSD patients’ symptoms negatively impacts treatment outcome in civilian populations. However, studies have yet to investigate the effect of expressed emotion on the course of PTSD symptoms and associated problems in military personnel. Therefore, the purpose of the present investigation was to examine the impact of collateral reporter expressed emotion and relationship satisfaction on salient empirically indicated correlates of PTSD in military personnel, including PTSD symptoms themselves, depression, and alcohol use. A total of 821 soldiers (female n = 145) and 45 collateral reporters (female n = 15) participated in the baseline assessment time point of the study. In addition to the baseline assessment time point, participants completed measures at 6-month follow up. Separate hierarchical multiple regression analyses were conducted to investigate the association of
soldier PTSD symptoms, depression, and alcohol use with expressed emotion and relationship satisfaction. Implications of these findings may highlight particular targets for development of innovative interventions aimed at treating and/or preventing negative outcomes in military personnel as well as their significant others.
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First, I would like to thank my dissertation chair and major professor, Dr. Bradley Green, without whom this project would not have been possible. Though the process has been difficult at times, I am appreciative of his expertise, patience, and support throughout the duration of this research and throughout my graduate career. Special thanks are also warranted to Dr. Michael Anestis who not only served as a committee member but also allowed the data for this project to be collected within the context of his Military Suicide Research Consortium (MSRC) grant-funded study. Additional thanks are also owed to my other dedicated committee members, Dr. Randolph Arnau and Dr. Richard Mohn, for their time, suggestions, and encouragement throughout this project.

Lastly, I am appreciative of the USM graduate research assistants funded by the MSRC grant for their assistance in data collection. I would also like to thank the MSRC for the work they do, which allowed me to investigate my dissertation research question.
DEDICATION

I would like to dedicate my dissertation to the memory of my father, Peter Zawilinski, who taught me the importance of hard work and perseverance and always encouraged me to reach my full potential.
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CHAPTER I

INTRODUCTION

Posttraumatic stress disorder (PTSD) is a chronic and disabling psychological condition (Koenan, Stellman, Sommer, & Stellman, 2008; Schnurr, Lunney, Bovin, & Marx, 2009). Prevalence rates for PTSD have been shown to be particularly high among military personnel (American Psychiatric Association, 2013). As such, Veterans and active duty soldiers experience significant problems associated with PTSD, notably depression, alcohol abuse, and interpersonal relationship problems (Koenan et al., 2008; Kruse, Steffen, Kimbrel, & Gulliver, 2011; Meis, Erbes, Polusny, & Compton, 2010; Meyer, Kimbrel, Tull, & Morissette, 2011; Milliken, Auchterlonie, & Hoge, 2007). PTSD symptoms not only negatively impact the Veteran/soldier but also negatively impact individuals with whom the Veteran/soldier has close relationships, such as family members and spouses (Calhoun, Beckham, & Bosworth, 2002; Dekel, Solomon, & Bleich, 2005). Previous research on civilians has indicated that family members’ and spouses’ responses, specifically their expressed emotion, regarding the patient’s PTSD symptoms, have been shown to negatively impact PTSD treatment compliance and outcome as well as relapse rates (Tarrier, Sommerfield, & Pilgrim, 1999b). However, studies have yet to investigate the effect of family members’ or spouses’ expressed emotion on the course of PTSD symptoms and associated problems in military populations.

Given the impact of the PTSD symptoms experienced by military personnel on their family members/spouses and the possible influence of family members/spouses
responses to psychopathology on treatment outcome and functioning, family involvement in Veteran mental healthcare has been emphasized nationwide (Department of Veterans Affairs, 2004). Therefore, possessing a better understanding of the relation between military personnel and those with whom they have close relationships may assist mental health professionals in offering the most appropriate treatment possible. Thus, the purpose of this study is to investigate the effects of family members or spouses’ (which for the purposes of the current study will be referred to as collateral reporters) expressed emotion and relationship satisfaction on the salient empirically indicated correlates of PTSD in military personnel, including PTSD symptoms themselves, depression, and alcohol use. The primary aim of this investigation is to elucidate the manner in which the interaction of soldier PTSD symptoms, alcohol use, and depression relate to both their expressed emotion and relationship satisfaction and the expressed emotion and relationship satisfaction of the collateral reporter over time. Implications of the findings of this research may highlight particular targets for development of innovative interventions aimed at treating and/or preventing negative outcomes in both soldiers/Veterans with PTSD and their significant others.

PTSD in the Military

PTSD has been conceptualized to develop as a result of experiencing a traumatic event, either directly or indirectly, that involves actual death or the threat of death, serious injury, or sexual violence. Elevated PTSD prevalence rates have been demonstrated among military personnel given the greater likelihood of trauma exposure (APA, 2013). Rates of PTSD in United States adults in general have been shown to range from 6.5%-
8.6% for lifetime prevalence (APA, 2013; Kessler, Chiu, Demler, & Walters, 2005; Pietrzak, Goldstein, Southwick, & Grant, 2011) and 3.5% for 12 month prevalence (APA, 2013). However, PTSD prevalence rates among Vietnam Veterans has been shown to range from 19-30% for lifetime prevalence (Macgruder & Yeager, 2009; Moore & Penk, 2011). Notably, 10% of Vietnam veterans continue to experience significant PTSD symptoms 30 years following their military service (Koenen et al., 2008). More recently, prevalence rates for current PTSD in soldiers of Operation Enduring Freedom (OEF)/Operation Iraqi Freedom (OIF) have ranged from 4%-20% (Gates et al., 2012; Renshaw, Rodrigues, & Jones, 2009; Macgruder & Yeager, 2009; Moore & Penk, 2011). Thus, elevated prevalence rates for PTSD in military personnel has been repeatedly documented over the last approximately 60 years regardless of war era.

Associated Psychological Problems

PTSD in Veterans and active duty military personnel has consistently been shown to be associated with other psychological symptoms and problems. Extensive research has been conducted investigating the association between PTSD and depression, given the high rates of comorbidity (Stander, Thomsen, & Highfill-McRoy, 2014). Rates of comorbid PTSD and depression have been shown to be approximately 11% in active duty military service members, with only 1% of the sample meeting criteria for PTSD alone (Ramsawh et al., 2014). In help-seeking military Veterans, 72-84% meet criteria for PTSD and a depressive disorder, with up to 68% meeting criteria for major depressive disorder (MDD) and 34% meeting criteria for dysthymia (Keane & Kaloupek, 1997). Comorbid PTSD and depression in military personnel have been associated with greater
severity of PTSD and depressive symptoms, lower quality of life, and lower perceived post-deployment social support (Ikin, Creamer, Sim, & McKenzie, 2010; Keane & Kaloupek, 1997; Rauch et al., 2010). Military personnel with PTSD and comorbid depression also demonstrate higher rates of suicidality and are 2.6 times more likely to report suicidality over the past year when compared to those with either diagnosis alone even after adjusting for depression (Ramsawh et al., 2014).

Several risk factors for the development of comorbid PTSD and depression have been investigated and have included occupational specialty while in the military (e.g., working in Navy health care or Marine Corps combat operations during deployment; Mayo, MacGregor, Dougherty, & Galarneau, 2013), personality traits (e.g., higher levels of negative emotionality; Meyer et al., 2011), and having experienced a traumatic brain injury especially when continuing to experience post-concussive symptoms (Morissette et al., 2011). Fairly consistent empirical evidence has been provided that PTSD itself poses a risk for the subsequent development of comorbid depressive disorders. A recent review by Stander and colleagues (2014) indicated that the majority of studies have found that common factors, such as deployment history or combat exposure histories, significantly predicted PTSD and not depression, providing evidence that depression may develop as a result of PTSD. However, findings from two longitudinal studies suggested that both PTSD and depression were, in fact, predicted by common factors, suggesting that the two disorders may share common risk factors. Researchers have also speculated that common vulnerabilities may also influence the development of comorbid PTSD and depression; however, research in this area is in the nascent stages (Stander et al., 2014).
Problematic alcohol use also frequently co-occurs with PTSD in military personnel (Kruse et al., 2011; Meis et al., 2010). Greater levels of problematic drinking have been shown in combat Veterans with PTSD versus those without a PTSD diagnosis regardless of severity of the trauma (Stewart, 1996). In clinical/treatment-seeking samples of male combat Veterans with PTSD, rates of alcohol abuse/dependence range from 41-85% and in community samples of military personnel have been shown to be approximately 39% although the exact rates tend to vary across studies (Keane & Kaloupek, 1997; Stewart, 1996). Veterans with alcohol dependence alone have reported more and heavier drinking days than those with comorbid PTSD and alcohol dependence. However, those with comorbid PTSD and alcohol dependence report more problems related to drinking, indicating that greater problems are experienced at lower levels of consumption (Fuehrlein et al., 2014).

Problematic alcohol use in addition to PTSD does not always potentiate negative outcomes as might be expected, and other factors have been shown to better explain such outcomes. For example, Veterans with comorbid PTSD and problematic substance use and those with PTSD only both demonstrate significantly higher mean depression scores and higher levels for victimization/perpetration of psychological aggression (e.g., insulting a partner or being insulted by a partner) than those with problematic substance use alone. The aforementioned results suggest that PTSD may have a strong impact on depression and psychological aggression with or without substance abuse problems (Owens et al., 2013).
A number of mechanisms, such as the self-medication, high risk, susceptibility, and third variable hypotheses, have been theorized to explain the elevated levels of comorbidity between PTSD and problematic alcohol use (Kruse et al., 2011). The two most commonly investigated of these mechanisms appear to be the self-medication and high risk hypotheses. The self-medication hypothesis posits that the experience of PTSD symptoms subsequent to trauma exposure increases risk for problematic substance use in that individuals begin to use substances to relieve emotional and/or physical pain or distress associated with PTSD symptoms (Keane & Kaloupek, 1997; Kline et al., 2014; Kruse et al., 2011). The high-risk hypothesis asserts that behaviors linked with problematic alcohol use reflect a general tendency to participate in high-risk behaviors which in turn increases probability of trauma exposure (Kline et al., 2014; Kruse et al., 2011). The self-medication hypothesis is considered to have gained the most convincing support such that PTSD has often been found to precede the occurrence of substance use disorders (SUDs; Kruse et al., 2011). That is, longitudinal research findings have shown that pre-existing alcohol use disorders (AUDs) in National Guard soldiers did not increase vulnerability for developing PTSD but that pre-existing PTSD, especially avoidance symptoms, significantly increased susceptibility for AUDs (Kehle et al., 2012; Kline et al., 2014).

PTSD not only negatively affects the Veteran/soldier but also has an impact on the emotional well-being of individuals with whom the soldier or Veteran has close relationships. The majority of the research in this area has focused on the impact of Veteran PTSD on spouses and family members. As such, studies have shown that spouses
and family members of Veterans with PTSD also experience emotional distress and poorer psychological adjustment (Calhoun et al., 2002; Dekel et al., 2005). For instance, children of Veterans with PTSD have a higher likelihood of exhibiting difficulties with emotion regulation, peer relations, and academics as well as behavioral problems, anorexia, and attention-deficit/hyperactivity disorder compared to children of Veterans without a PTSD diagnosis (Galvoski & Lyons, 2004). Intimate relationship partners (typically spouses) of Veterans have reported higher levels of psychological symptomatology, especially PTSD, and increased anxiety, depression, and hostility themselves (Calhoun et al., 2002) than the general population (Miller, Reardon, Wolf, Prince, & Hein, 2013).

Relationship Functioning and Perceived Social Support

Research has shown that Veterans diagnosed with PTSD ranked interpersonal relationship difficulties among their most serious problems (Biddle, Elliot, Creamer, Forbes, & Devilly, 2002). PTSD in military personnel has been shown to be associated with higher levels of marital dissatisfaction and relationship problems when compared to those without a PTSD diagnosis across war eras. For example, in one study, 30% of World War II prisoners of war (POWs) with PTSD reported experiencing marital distress compared to 11% of those without PTSD (Cook, Riggs, Thompson, Coyne, & Sheikh, 2004). In Vietnam Veterans and OEF/OIF era soldiers enlisted in the Army National Guard and U.S. Air Force who were deployed, PTSD symptom severity was associated with both poorer relationship functioning and marital satisfaction when examined both cross-sectionally (Balderrama-Durbin et al., 2013; Galovski & Lyons, 2004; Riggs,
Byrne, Weathers, & Litz, 1998; Renshaw et al., 2009; Schnurr et al., 2009) and longitudinally (Koenan et al., 2008).

Higher levels of marital or relationship dissatisfaction are also reported by intimate relationship partners of military personnel diagnosed with PTSD when compared with partners of those without PTSD. Of female partners of male Vietnam Veterans diagnosed with PTSD, 71% endorsed experiencing clinically significant levels of relationship distress as compared to 36% of partners of Veterans who were not diagnosed with PTSD (Riggs et al., 1998). Intriguingly, research has also shown that greater levels of marital discord are reported by military spouses of military personnel compared to civilian spouses such that military spouses were four times more likely to frequently think about divorce when compared to civilian spouses (Asbury & Martin, 2012).

Research has also been conducted investigating the impact of PTSD symptomatology in the Veteran/soldier on relationship functioning as perceived by both the Veteran/soldier and their significant other. Findings of previous research on Vietnam Veterans and their female partners indicated that PTSD diagnosis in the Veteran significantly predicted more relationship distress and problems for both the Veteran and their partner (Riggs et al., 1998). Similarly, studies of OEF/OIF Army soldiers have shown that trauma symptoms (i.e., dissociation, sleep problems) in soldiers were significantly associated with lower relationship satisfaction for both soldiers and their female partners (Nelson-Goff, Crow, Reisbig, & Hamilton, 2007).

Perceived social support has also been shown to be negatively associated with post-deployment PTSD symptom severity in military personnel (Renshaw et al., 2009). In
OEF/OIF Army and National Guard soldiers, higher post-deployment PTSD symptoms were associated with lower levels of social support (Griffith, 2012) above and beyond unit support during deployment (Brancu et al., 2014). Not surprisingly, the highest levels of social support were demonstrated in Iraq/Afghanistan era Veterans without a PTSD diagnosis. In these Veterans, social support levels are shown to decrease by 15% when a Veteran has been diagnosed with PTSD only and to decrease by 25% when Veterans were diagnosed with PTSD plus an additional comorbid disorder (Brancu et al., 2014). In addition, in U.S. Air Force airmen, greater relationship distress predicted lower likelihood of airmen disclosing information about deployment and combat-related experiences to their intimate partners. Level of self-disclosure was also shown to partially mediate the relation between perceived partner support and post-deployment PTSD symptom severity. Therefore, relationship distress may interfere with the processing of events that occurred during deployment which, has been considered a useful way to cope with post-deployment stress (Balderrama-Durbin et al., 2013).

It has been assumed that low levels of social support post-deployment lead to an increase in PTSD symptoms because individuals have not had the opportunity to rely on social support networks to cope with PTSD symptoms, an assumption posited by the stress buffering model. Further, the stress buffering model asserts that increasing social support and relationship satisfaction post-deployment, especially in family, intimate, and military peer relationships, will serve to reduce the severity of PTSD symptoms over time (Cohen & Wills, 1985).
However, the results of one longitudinal study that examined the directionality of the relation between social support and PTSD symptom severity in male Gulf War Veterans indicated that post-deployment PTSD symptom severity negatively affected future social support. Similar results were found in another longitudinal study examining the relation between PTSD and family support where elevated PTSD symptoms at 14 months post-deployment were associated with less family support at approximately two years post-deployment (Wright, Kelsall, Sim, Clarke, & Creamer, 2013). These findings provide evidence against the traditional assumption that lower social support increases PTSD symptomatology over time. Instead, findings suggest that the interpersonal difficulties that military personnel diagnosed with PTSD experience may lead to lower levels of social support over time (King, Taft, King, Hammond, & Stone, 2006). The aforementioned results are consistent with the erosion model which posits that PTSD symptoms in and of themselves have a negative impact on interpersonal relationships and cause a reduction in social support over time (King et al., 2006). Previous research has shown that PTSD symptoms (e.g., numbing, irritability, and social avoidance and/or withdrawal) interfere with emotional intimacy resulting in a reduction of social support (Mikulincer, Florian, & Solomon, 1995; Riggs et al., 1998). Cognitive models of PTSD have been considered consistent with the erosion model, and empirical support has been demonstrated for both the cognitive and erosion models (Ehlers & Clark, 2000; King et al., 2006; Laffaye, Cavella, Drescher, & Rosen, 2008).
Expressed Emotion

The link between mental health status and family relationships has long been a focus of research. One initial motivation for research on the impact of the family emerged when it was realized that relapse rates among patients with schizophrenia during the year subsequent to a hospitalization stay were significantly related to where they resided following discharge (Leff & Vaughn, 1985; Vaughn & Leff, 1976). Specifically, early research results indicated that approximately 50% of patients living with a spouse or their parents had at least one instance of readmission following discharge, compared with only 30% of those living alone. At this point, scholars speculated that one possible mechanism, that may more specifically explain the link between relapse in schizophrenia and living environment, was an emotional atmosphere characterized by hostility, criticism, and over-involvement, which would come to be known as expressed emotion (EE; Leff, 1976).

EE refers to the frequency of critical comments and/or the degree of emotional over-involvement expressed by family members (Seywert, 1984). For content to be considered critical, the statement has to be an explicit and unequivocal remark of resentment, disapproval, or dislike; however, statements can be judged to be critical by tone alone (Brown, Birley, & Wing, 1972; Leff, 1976). Emotional over-involvement, judged on the basis of the feelings communicated or behavior reported in the family environment, was intended to uncover unusual concern about the patient (Brown et al., 1972; Leff, 1976). Examples of unusual concern include overprotection, constant
nervousness about insignificant matters such as the nutritional value of food eaten by the patient or what time they arrive home at night (Leff, 1976).

Following initial work, research investigating EE has continued for over 40 years and has repeatedly demonstrated an association between EE and outcomes (Wearden, Tarrier, Barrowclough, Zastowny, & Rahill, 2000). A review conducted by Kavanagh (1992) indicated that of 23 naturalistic studies evaluated, only three did not find a greater relapse rate in patients living with high EE families upon discharge. Wearden et al. (2000) noted that researchers have also suggested the presence of “a complex circular relationship between EE and relapse, where the patient’s behavior leads to changes in the relative’s EE and the relative’s EE in turn affecting the course of the patient’s illness” (Hooley & Richters, 1995, p. 636). Research has shown that high EE relatives often attribute the causes of negative behaviors in the patient as internal, personal, or controllable whereas low EE relatives more often attribute these behaviors to external, universal, or factors that cannot be controlled (Miklowitz, 2004). In addition, patients who live with a high EE relative have been shown to have poor social functioning (Barrowclough & Tarrier, 1990). In general, high EE relatives seem to have difficulty with effective communication in that they are frequently talking and listening less effectively (Wearden et al., 2000). Not surprisingly, EE in significant others has also been demonstrated to be negatively correlated with marital satisfaction, and both marital satisfaction and EE have been shown to be correlated with relapse in patients with depression (Hooley & Teasdale, 1989).
Given the elevated relapse rates among patients who have contact with high EE relatives, psychological treatments have been developed based on modifying EE (Wearden et al., 2000). The majority of family therapy models aimed at modifying EE focus on psychoeducation about the disorder to increase understanding and ability to cope, and teaching communication and problem-solving skills with the family in an effort to change unproductive cycles of interaction. Research has shown that family psychoeducational therapy in combination with pharmacotherapy was associated with decreased incidence of relapse in schizophrenia. Schizophrenia patients evidenced relapse rates that ranged from 0-33% (M=12.5%) when receiving family psychoeducational therapy compared with relapse rates of 17-61% (M= 42%) among patients receiving customary care. At 2 years post-treatment, the family therapy demonstrated the lowest rates of relapse when compared to neuroleptic maintenance alone, neuroleptic maintenance plus individual social skills training, or family therapy plus social skills training. Fewer days of illness, higher likelihood of being episode free for the entire 2 years, and improved family and social relationships were also seen in the family therapy combined with medication condition (Miklowitz, 2004).

Expressed Emotion and PTSD

To date, limited research has been conducted examining EE in significant others of patients with PTSD. The first published investigation of EE in significant others of patients with PTSD was part of a larger treatment outcome study comparing effects of imaginal exposure and cognitive therapy (Tarrier, 1996; Tarrier et al., 1999a; Tarrier et al., 1999b). Significant others of patients who completed the study (n= 31) were
comprised of spouses (74%), parents (13%), and other family members or friends (13%). Approximately half of the significant others in this study were classified as high EE which was noted to be comparable to the rates of high EE found in studies investigating EE in schizophrenia (Kavanagh, 1992; Tarrier, 1996; Tarrier et al., 1999b). No significant associations emerged between EE and type of trauma or type of relationship the significant other had with the PTSD patient.

Results revealed that severity of PTSD symptoms decreased significantly more over the course of treatment in the low EE group when compared to the high EE group. PTSD intrusion symptoms, depression, and anxiety were also significantly lower in the low EE group compared to the high EE group at post-treatment. In addition, significant differences also emerged between patients with high and low EE relatives on the secondary treatment outcome measures of depression and anxiety such that patients with low EE relatives endorsed higher levels of depression and anxiety at pre-treatment. Such findings were inconsistent with the prediction that a high EE response would occur as a result of greater severity of psychopathology. Thus, the authors speculated that these differences suggest that high EE may not simply be a reaction to the more severe psychopathology (Tarrier, 1996; Tarrier et al., 1999b). However, the pre-treatment differences between high EE versus low EE groups with regard to depression and anxiety may have impacted treatment outcome results due to greater reductions in symptoms being possible and/or regression toward the mean.

A follow-up to the Tarrier et al. (1999b) study was conducted also using the sample from the Tarrier, Pilgrim, et al. (1999) study. The study examined the effects of
the hostility dimension of EE on PTSD symptoms at six and 12 months following treatment and the extent to which relatives attributed PTSD patients’ problems to be a result of PTSD or other psychological issues (Barrowclough, Gregg, & Tarrier, 2008). Results indicated that the hostility dimension of EE and number of missed therapy sessions were the only significant predictors of PTSD symptoms at 6- and 12-months post-treatment even after controlling for baseline PTSD symptoms. There were no significant relationships between attributions and PTSD symptoms. Findings also demonstrated that the criticism and hostility dimensions of EE in relatives were associated with relatives attributing the PTSD patient’s problems as under their control in that critical and hostile relatives were more likely to indicate that the PTSD patient was responsible for bad outcomes related to their mental health than low EE relatives (Barrowclough et al., 2008) which is consistent with previous research in relatives of patients with schizophrenia (Miklowitz, 2004).

In a published editorial, Rabstejnek (2008) applied the reciprocal model of expressed emotion to military personnel who had recently returned from deployment and to their family members. Rabstejnek (2008) stated that once the Veteran/soldier begins to reflect on experiences while on deployment, reciprocal reactions occur where the family member reacts to the Veteran/soldier, who in turn, reacts to the family member; after time goes by and “the honeymoon period ends,” PTSD symptoms begin to onset (p. 13). Rabstejnek (2008) goes on to state that both the family member and the Veteran/soldier are experiencing difficulties and it is important for the needs of both parties to be taken into consideration. When the difficulties and needs of both parties interact, an evocation
of emotions and behaviors may occur where symptoms perpetuate negative interactions, which increases EE and exacerbates the symptoms of everyone involved. Thus, it was recommended that family expressed emotion be assessed in Veterans upon returning from war in order to assist mental health professionals in helping Veterans adjust to civilian life with their families (Rabstejnek, 2008).

**Family/Couple Psychosocial Treatments for PTSD in Military Personnel**

Given the significant impact family members and/or spouses can have on treatment outcome and relationship satisfaction and the previously described interpersonal relationship problems experienced by Veterans/soldiers and their families, incorporating family and/or intimate relationship partners in PTSD treatment has been repeatedly recommended (Hooley & Teasdale, 1989; Maack, Lyons, Connelly, & Ritter, 2011; Monson, Schnurr, Stevens, & Guthrie, 2004; Riggs, 2000; Tarrier et al., 1999b).

Couples/family therapy for PTSD in military personnel and their family members or spouses share a number of common components with each other, such as psychoeducation regarding PTSD, increasing effective communication and problem-solving skills, and decreasing experiential avoidance (Fischer, Sherman, Han, & Owen, 2013; Jacobsen, Christensen, Prince, Cordova, & Eldridge, 2000; McDevitt-Murphy, 2011; Monson et al., 2004; Sautter, Glynn, Thompson, & Franklin, 2009) and with the couples/family treatments developed to modify EE in patients with schizophrenia and their significant others. A number of specific couple/family treatment packages have been developed and are available, each with varying levels of empirical support. Specific packages include the Reaching out to Educate and Assist Caring, Healthy Families
(REACH; Fischer et al., 2013) program for intimate partners and family members, Integrative Behavioral and Couple Therapy (IBCT; Jacobsen et al., 2000), Structured Approach Therapy (SAT; Sautter et al., 2009) for couples, Project VALOR (McDevitt-Murphy, 2011) which includes significant others and incorporates alcohol misuse as a treatment target, and cognitive behavioral conjoint therapy for PTSD (CBCT; Monson et al., 2004) for intimate partners.

Cognitive Behavioral Conjoint Therapy (CBCT; Monson et al., 2004), in particular, is based on a reciprocal model that asserts that PTSD symptoms in military personnel can damage interpersonal relationships (as described above) leading to a reduction in social support (King et al., 2006). Reduction in social support may also be due to family members’/significant other’s reluctance to provide support because they have been hurt by the Veteran’s behavior and/or their own distress, such as tension or hostility. PTSD symptoms may then be triggered by increased distress in the family or significant other (Sherman, Fischer, Sorocco, & McFarlane, 2009), a cycle consistent with the assertion made by Rabstejnek (2008). Communication skills deficits and behavioral avoidance underlie this reciprocal relationship and maintain the cycle (Monson et al., 2004). Thus, the primary goals of CBCT for PTSD are to reduce PTSD symptoms and improve relationship functioning in the couple (Schumm, Fredman, Monson, & Chard, 2013).

CBCT for military personnel with PTSD and their relationship partners is gaining empirical support. Results of one study examining CBCT for PTSD in Vietnam Veterans and their wives showed moderate improvements in PTSD symptoms and large
improvements in depressive symptoms, anxiety symptoms, and social functioning were reported by the Veteran. In addition, large improvements in relationship satisfaction, general anxiety symptoms, and social functioning were reported by the Veterans’ wives (Monson et al., 2004). In an investigation of CBCT for PTSD in a community sample, including civilians and OIF veterans with PTSD due to combat exposure and their partners, findings showed significant large effect size improvements in PTSD symptoms and relationship adjustment from pre- to post-treatment (Monson et al., 2011). Results of an uncontrolled trial comprised of OEF/OIF male Veterans with combat-related PTSD and their female intimate relationship partners demonstrated that none of the five Veterans that participated in the post-treatment assessment met diagnostic criteria for PTSD and one of four Veterans who met criteria for MDD at pre- continued to meet criteria for MDD at post-treatment. In addition, statistically significant, large effect-size improvements were demonstrated across PTSD symptom severity measures rated by the Veteran, partner, and the clinician (Schumm et al., 2013). Randomized clinical trials (RCTs) with larger samples of military personnel and inclusion of active control conditions (such as well-established treatments for PTSD and comparisons with other couples/family therapy packages) are needed to further determine CBCT efficacy; however, initial results suggest that CBCT may be a promising treatment for PTSD in military personnel and their spouses.

Limitations of Previous Research

The Tarrier et al. (1999b) and Barrowclough et al. (2008) studies provided empirical support for expressed emotion as an important predictor of treatment outcome
in civilians with PTSD who were currently participating in psychological treatment. Specifically, findings of these studies indicated that expressed emotion impedes PTSD symptom improvement over the course of therapy and up to a year following therapy, and the hostility dimension, in particular, impeded treatment compliance in the form of session attendance (Barrowclough et al., 2008; Tarrier et al., 1999b). These findings coupled with research findings indicating an association between PTSD symptoms and relationship satisfaction, level of social support, and the negative impact on family members/spouses (Calhoun et al., 2002; Dekel et al., 2005; Nelson-Goff et al., 2007; King et al., 2006) are repeatedly provided as rationale for the development and provision of couples/family therapy for PTSD in military personnel and their significant others. However, studies have yet to explicitly investigate the impact of family member/spouse expressed emotion on PTSD symptom expression in military personnel with PTSD.

As previously described, the theoretical model for CBCT posits a circular relationship between PTSD symptoms in the Veteran and interpersonal functioning where PTSD symptoms in the Veteran contribute to distress in the spouse, which in turn maintains and exacerbates PTSD symptoms in the Veteran (Monson et al., 2004). The proposed model of CBCT is similar to the reciprocal model of the effects of EE on relapse suggested by researchers where the patient’s behavior prompts changes in the relatives EE and, in turn, the relative’s EE affects the course of the psychological disorder (Hooley & Richters, 1995). Taken together, these findings suggest that collateral reporter EE and relationship satisfaction may have a reciprocal relationship with soldier PTSD. However, studies have yet to investigate the reciprocal influence of EE on PTSD.
symptom expression as well as the influence of PTSD symptom expression on EE across multiple time points. In addition, research has yet to focus on examining the reciprocal impact of EE on the expression of symptoms that frequently co-occur with PTSD (e.g., alcohol use and depression).

Initial treatment outcome studies, such as investigations of CBCT, have found that social functioning and PTSD and related symptomatology (e.g., depression) improved as a result of targeting PTSD symptoms and relationship functioning (Monson et al., 2004, 2011; Schumm et al., 2013). Additionally, previous research has shown that EE in significant others is negatively associated with marital satisfaction and both marital satisfaction and EE are correlated with relapse in patients with depression (Hooley & Teasdale, 1989). Nonetheless, studies examining the relation between EE and relationship satisfaction in military personnel with PTSD have yet to be conducted.

Research findings have also repeatedly shown that symptoms of PTSD in Veterans/soldiers are associated with poorer relationship satisfaction as appraised by the soldier. Results of one study also indicated that Veterans experiencing PTSD, problematic alcohol use, and depression demonstrate elevated levels of perpetration of psychological aggression such as criticizing their partner (Owens et al., 2013). Studies have yet to investigate the association between Veteran/soldier PTSD symptoms, problematic alcohol use, and depression and Veteran/soldier EE.

The Present Study

The purpose of the present investigation is to begin addressing some of the limitations of previous research. The current study will examine the impact of collateral
reporter EE and collateral reporter relationship satisfaction on salient empirically indicated correlates of PTSD in a sample comprised of military personnel. The primary aim of this study is to elucidate the manner in which collateral reporter EE and collateral reporter relationship satisfaction affects and/or predicts soldier expression of symptoms of PTSD, depression, and alcohol use and the manner in which soldier symptoms of PTSD, depression, and alcohol use impacts collateral reporter EE and relationship satisfaction over time (i.e. at six month follow up). Therefore, the longitudinal relationships among these variables will be examined using a series of hierarchical multiple regression analyses.

As described previously, findings of previous research suggest reciprocal relationships may exist between collateral reporter EE and soldier PTSD symptoms (Hooley & Richters, 1995; Rabstejnek, 2008) and between soldier PTSD symptoms and collateral reporter relationship satisfaction (Monson et al., 2004). Depression and problematic alcohol use commonly co-occur in military personnel with PTSD (Kruse et al., 2011; Meis et al., 2010; Meyer et al., 2011; Nelson-Goff et al., 2007; Riggs et al., 1998). Previous research results have also indicated that PTSD has a strong impact on depression and perpetration of psychological aggression with or without substance abuse problems (Owens et al., 2013). As such, it is hypothesized that collateral reporter EE at baseline will predict the interaction of soldier PTSD symptoms, depression, and alcohol use at 6-month follow up, and that the interaction of soldier PTSD symptoms, depression, and alcohol use at baseline will predict collateral reporter EE at 6-month follow up.
Relationship dissatisfaction has also been shown to co-occur with PTSD, depression, and problematic alcohol use in military personnel and their significant others. Therefore, it is hypothesized that collateral reporter relationship satisfaction at baseline will predict the interaction of soldier PTSD symptoms, depression, and alcohol use at 6-month follow up and that the interaction of soldier PTSD symptoms, depression, and alcohol use will predict collateral reporter relationship satisfaction at 6-month follow-up given that collateral reporter relationship satisfaction is considered to be based, at least in part, on reactions to soldier symptoms (Hooley & Richters, 1995; Monson et al., 2004). It is also hypothesized that soldier relationship satisfaction at baseline will predict soldier PTSD symptoms, depression, and alcohol use both at baseline and at 6-month follow-up and that soldier PTSD symptoms, depression, and alcohol use at 6-month follow-up will predict soldier relationship satisfaction at 6-month follow-up as well as at the baseline time point.

A secondary aim of the present study is to explore the cross-sectional and longitudinal relationships among PTSD symptoms, depression, alcohol use, and expressed emotion in the soldier. It is hypothesized that soldier PTSD symptoms, depression, and alcohol use at baseline will statistically significantly relate to soldier EE at baseline and 6-month follow-up. It is also hypothesized that soldier PTSD symptoms, depression, and alcohol use at 6-month follow-up will statistically significantly predict soldier EE at 6-month follow-up and at the baseline time point.
CHAPTER II

METHOD

Participants

A total of 821 soldiers (female n = 145) participated at the baseline time point of the current study. Ages ranged from 17-61 (M=27.45; SD= 10.26). Racial backgrounds of the sample included: 62.4% Caucasian, 26.2% African-American, 4.4% Hispanic/Latino, 2.1% Asian/Pacific Islander, 1% Native American, and 3% Other. Participants were US Army National Guard (91.5%), US Army (4.5%), US Air National Guard (.2%), and Other (3%; primarily US Army Reserve) soldiers. Of these soldiers, 60.5% had been deployed, 31.5% had never been deployed, and 8% did not indicate whether they had been deployed or not. Soldiers were recruited through Camp Shelby, a military post located near Hattiesburg, Mississippi. At the baseline assessment time point, soldiers were asked to provide the name and contact information for a collateral reporter subsequent to participation in the study tasks. Collateral reporters (CR) were identified by the soldier as the person with whom they feel they have the closest relationship and with whom they expected to spend the most time over the following 18 months.

A total of 45 collateral reporters (female n = 15) participated in the baseline assessment of the current study. Ages ranged from 19-65 (M=28.73; SD= 10.31). Racial backgrounds of the sample included: 56.8% Caucasian, 31.8% African-American, 9.1%
Hispanic/Latino, and 2.3% Other. Of the 45 collateral reporters, 35 reported currently serving or having served in the US military. Collateral reporters were friends (27.9%), spouses (14%), romantic partners (not married; 14%), other relatives (11.6%), parent (2.6%), and other (30.2%; primarily coworkers or squad leaders) of the soldiers included in the study.

Measures

The Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) is a 10-item instrument designed to assess alcohol consumption, drinking behavior, and alcohol-related problems. The AUDIT can be administered as a self-report measure or as an oral interview. Items are rated on a 5-point Likert scale that ranges from 0-4, with higher scores indicating more problematic alcohol use. A score of 8 or more is indicative of harmful or hazardous drinking, and a score of 13 or higher in women and 15 or higher in men is indicative of alcohol dependence (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT has demonstrated good internal consistency reliability with alpha ranging from .83 to .98 (Leung & Arthur, 2000; Reinert & Allen, 2007; Swanholm, Vosvick, & Chng, 2009). The AUDIT has also been found to possess good test-retest reliability ($r = .86$; Babor et al., 2001). For the current study, the self-report instrument was administered as a self-report measure to soldiers at baseline and at the 6-month follow-up time point, and composite scores were computed for use in analyses. Internal consistency reliability for the AUDIT in the present investigation was acceptable (alpha=.79; $n=695$) for baseline and excellent (alpha=.91; $n=105$) for the 6-month follow-up time point (Nunnally & Bernstein, 1994).
The *Family Attitudes Scale* (FAS; Kavanagh et al., 1997) is a 30-item, self-report questionnaire that assesses EE and can be administered to both patients and relatives. Respondents are asked to rate the frequency that each statement was true on a 5-point Likert scale, ranging from “0 = Never” to “4 = Every Day” and total scores are calculated by summing responses to all items, including 10 reverse-scored items. Research findings have indicated the FAS possesses excellent internal consistency (alpha ≥ .95), and good concurrent validity. Specifically, the FAS has been found to be significantly associated with the Camberwell Family Interview (CFI; Kavanagh et al., 1997, 2008), which has been considered the gold standard in the measurement of EE (Van Humbeeck, Van Audenhove, De Hert, Pieters, & Storms, 2002). In addition, the FAS has demonstrated good predictive validity for relapse in patients diagnosed with psychosis (Hooley & Parker, 2006). In the present study, the FAS was administered to both soldiers and collateral reporters at baseline and at the 6-month follow up time point and items were summed to produce a composite score for use analyses. For soldiers, internal consistency reliability for the FAS in the current study was excellent for baseline (alpha=.95; n=84) and for the 6-month follow up time point (alpha= .91; n=105). For collateral reporters, internal consistency reliability was also excellent for baseline (alpha= .94; n= 25; Nunnally & Bernstein, 1994). Alpha was not computed for collateral reporters at 6-month follow-up due to extremely low sample size (n=4).

The *Patient Health Questionnaire-Somatic, Anxiety, and Depressive Symptoms* (PHQ-SADS; Kroenke, Spitzer, Williams, & Lowe, 2010) is a 36-item self-report composite measure that assesses depression, anxiety, and somatic symptoms. For the
purposes of this study, the data from the depression (9 items) subscale obtained from soldiers at baseline and at 6-month follow up was used in the analyses. General depression items are rated based on frequency over the previous 2 weeks and scored on a Likert scale ranging from 0 (not at all) to 3 (nearly every day). Items are summed to obtain a composite depression score. Previous research has shown that the PHQ-SADS depression subscale possesses good internal consistency reliability with alpha ranging from .86 to .89, good test-retest reliability (r = .84 for depression), and good convergent validity with other measures of depression symptoms (r = .74; Kroenke et al., 2010; Löwe et al., 2004). Internal consistency for the PHQ depression subscale for soldiers in the present study was good at baseline (alpha=.89; n=548) and excellent at 6-month follow up (alpha=.93; n=89; Nunnally & Bernstein, 1994).

The PTSD Checklist (Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report questionnaire that measures PTSD symptoms. For the purposes of this study, the PTSD Checklist-Military (PCL-M) version will be utilized and was administered to the soldier at baseline and at the 6-month follow up time point. For the PCL-M, items are anchored to “stressful military experiences.” Item content is based on Diagnostic and Statistical Manual of Mental Disorders -4th Edition (APA, 1994) criteria, and respondents are asked to rate the degree to which symptoms bothered them in the past month on a 5-point Likert scale (“1” = not at all to ”5” = extremely). Factor analyses revealed that the PCL-M possesses four factors which include intrusion, avoidance, hyperarousal, and dysphoria. The PCL-M has demonstrated acceptable internal consistency (alpha ≥ .75), good convergent validity with other measures of PTSD
symptoms \((r \geq .84)\), and good temporal stability (Wilkins, Lang, & Norman, 2011). In the current study, the PCL-M demonstrated excellent internal consistency reliability at baseline \((\text{alpha}= .93; n=619)\) and at 6-month follow up \((\text{alpha}= .94; n=109; \text{Nunnally & Bernstein, 1994})\).

The *Relationship Assessment Scale-Generic* (RAS-G; Renshaw, McKnight, Caska, & Blais, 2011), a modified version of the Relationship Assessment Scale (RAS), is comprised of seven items measuring relationship satisfaction. Words that referred to romantic relationships on the RAS were changed to be more generic \(\text{(e.g. changing “partner” to “relative/friend”)}\). Items are rated on a 5-point Likert scale, with responses ranging from “1= Not Satisfied” to “5= Very Satisfied.” Items four and seven are reverse-scored. The RAS-G has demonstrated good internal consistency across relationship types \(\text{(alpha = .92 for parents, .86 for friends, .92 for romantic partners, and .90 for other relatives)}\). Additionally, study results indicated the RAS-G possesses adequate test-retest reliability, and factorial, convergent, and predictive validity across relationship types (Renshaw et al., 2011). The RAS-G was administered at baseline and at the 6-month follow up time point to both the soldiers and the collateral reporters. For soldiers, the internal consistency reliability for the RAS in the current study was good for baseline \(\text{(alpha= .89; n=117)}\) and excellent at the 6-month follow up time point \(\text{(alpha= .93; n=13)}\). For collateral reporters, internal consistency reliability for the RAS at baseline was good \(\text{(alpha= .88; n=40; \text{Nunnally & Bernstein, 1994})}\). Alpha was not computed for collateral reporter RAS at 6-month follow up due to extremely low sample size \(\text{(n=4)}\).

Procedure
Data was collected as part of an ongoing larger study funded by the Military Suicide Research Consortium aimed at examining risk factors for past and future suicidal self-directed violence (SSDV). Army personnel employed at Camp Shelby working in conjunction with research staff referred soldiers to the study and soldiers referred their identified collateral reporters to the study.

Prior to participation in the study, soldiers were given a detailed description of the study procedures and written informed consent was obtained. Soldiers completed the baseline portion of the study tasks via a laptop computer equipped with a mouse that is connected to a portable wireless Internet hotspot that was separate from and not connected to the military server. Soldiers completed a battery of self-report measures via Qualtrics, an Internet-based tool for constructing and administering surveys. The above-described questionnaires for the present study are included as part of the full self-report battery. Following completion of the self-report measures, soldiers completed one measure of implicit associations to suicidal content. At 6, 12, and 18 months following the initial completion of study measures (baseline), a secure link was sent to soldiers for completion of follow up assessments.

In addition to the baseline self-report measures, soldiers were asked to enter their name, up to two valid email addresses that they plan to use over the next 18 months, a phone number, and their current location and mailing address at each time point. Soldiers were informed that this information would only be used to connect their responses across time points, to provide necessary information to military personnel in order for the safety protocol to be enacted in the event that a soldier endorses imminent risk for SSDV during
a follow up assessment, and to allow for mailing payment. Soldiers were paid by check for their participation at each time point.

A secure link to a series of self-report questionnaires was sent to the collateral reporter. In the event that a collateral reporter did not have access to the Internet, paper copies of the questionnaires were sent along with a self-addressed stamped envelope for the collateral reporter to return the questionnaires. If the collateral reporter resided at Camp Shelby, he or she had the opportunity to complete the questionnaires at the study assessment site on laptop computers provided by the research team. At 6 months following initial completion of questionnaires, collateral reporters were sent a secure link to follow-up questionnaires. Study participants who did not respond via e-mail to the initial e-mails within 7 days were sent a second e-mail and contacted through other means if such contact information was provided. Collateral reporters who participated in the study were entered into a drawing for a chance to win one of 100 gift certificates worth $50.00.
CHAPTER III

RESULTS

Data Screening

First, frequencies and descriptives were calculated for all variables to be included in the analyses and were inspected to ensure the values included in the dataset were appropriate. Then, the histograms for each variable were examined for skewness and kurtosis. Non-normal distributions were observed. Z-scores were computed for each of the composite scores of each variable and examined for univariate outliers. Several cases possessed values greater than ±3. Given the apparent lack of normality and the presence of a number of outliers, the variables were transformed using Blom transformation in an effort to improve normality. After the transformation, histograms were re-inspected and the distributions appeared closer to normal. Z-scores were also re-computed on the transformed composite scores and examined. Nine cases possessed z-scores slightly greater than ±3. For the PCL-M, one value had a z-score greater than 3 and two values had z-scores greater than -3. For the AUDIT at baseline, two scores had z-scores greater than 3. Finally, for the PHQ-D at baseline, four scores possessed z-scores greater than 3. Given that the z-scores were only slightly above ±3 and the next lowest cases were just under 3, the values were retained as is for the remaining analyses.

Correlations
Pearson correlation coefficients were calculated between the majority of combinations of study variables (i.e., PCL-M, RAS-G, FAS, AUDIT, and PHQ-D scales) to explore the relationships among the variables.

**Cross-Sectional Correlation Analyses**

*Within Soldiers.* Results indicated a statistically significant negative correlation between baseline FAS and RAS (n=133). Statistically significant positive correlations were found between baseline PCL-M and baseline AUDIT (n=821), baseline PHQ-D and baseline AUDIT (n=671), and baseline PHQ-D and baseline PCL-M (n=665). At 6-month follow-up, a statistically significant negative correlation was found between 6-month FAS and 6-month RAS (n=13) and statistically significant positive correlations were found between 6-month AUDIT and 6-month PCL-M (n=117) and 6-month PCL-M and 6-month PHQ-D (n=100).

*Within Collateral Reporters.* Analyses revealed a statistically significant negative correlation between baseline collateral reporter FAS and RAS (n=45). Correlations were solely conducted cross-sectionally on collateral reporter baseline measures due to the extremely low sample sizes (n = 5) for both the FAS and RAS at 6-month follow up.

*Between Collateral Reporters and Soldiers.* Baseline soldier PCL-M, AUDIT, and PHQ-D were not statistically significantly correlated with collateral reporter FAS or RAS at baseline (n=13). Correlations were not computed for collateral reporter FAS and RAS at 6-month follow up with soldier PCL-M, AUDIT, and PHQ-D at 6-month follow up due to extremely low sample size (n ≤ 5).

**Longitudinal Correlation Analyses**
Within Soldiers. Results indicated statistically significant negative correlations between baseline FAS and RAS at 6-month follow up (n=11) and baseline RAS and FAS at 6-month follow up (n=11). Statistically significant positive correlations were also found between baseline FAS and 6-month FAS (n=11) and baseline RAS and RAS at 6-month follow up (n=11). With regard to symptom measures, statistically significant positive correlations were found between baseline PCL-M and 6-month PCL-M (n=114), baseline PHQ-D and 6-month PHQ-D (n=88), and baseline AUDIT and 6-month AUDIT (n=117). Statistically significant positive correlations were also revealed between baseline PCL-M and 6-month PHQ-D (n=97) and baseline PHQ-D and 6-month PCL-M (n=103). However, the correlations between baseline and 6-month follow up RAS and baseline and 6-month follow up AUDIT, PCL-M, and PHQ-D, and between baseline and 6-month FAS and AUDIT, PCL-M, and PHQ-D at both baseline and 6-month follow up were nonsignificant (see Table 1).
### Table 1

*All Possible Correlations between Study Variables*

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**Note.** FAS=Family Attitudes Scale (Kavanagh et al., 1997); RAS=Relationship Assessment Scale (Renshaw et al., 2011); PCL=PTSD Checklist-Military Version; PHQ=Patient Health Questionnaire (PHQ) depression subscale (Kroenke, et al., 2010); AUD=Alcohol Use Disorders Identification Test (Saunders et al., 1993); 6M=6 month follow up. **p < .01; *p < .05. Subscript numbers= sample size. -- = correlation coefficient not computed due to extremely low sample size.
Multiple Regression Analyses

Separate hierarchical multiple regression analyses were used to test the study hypotheses. Independent variables (e.g., baseline and 6-month PCL-M, PHQ-D, and AUDIT) were centered prior to inclusion in the analyses to aid in interpretation and reduce multicollinearity. As stated previously, sample sizes for each analysis conducted varied significantly. The sample sizes for all models were lower than the sample size needed to sufficiently power 3-step hierarchical multiple regression analyses.

Preliminary Analyses

Preliminary analyses were conducted to determine whether the assumptions for multiple regression (e.g., multicollinearity, homoscedasticity, multivariate outliers, normality, and linearity) were met. Tolerance statistics were computed and examined in order to evaluate the data included in each model that was analyzed for multicollinearity. Results revealed that, for each predictor, the tolerance statistics were greater than .2 for all models indicating that the independent variables (IVs) were not too highly correlated with one another and the assumption of multicollinearity was met.

Next, the assumption of homoscedasticity was evaluated by plotting the standardized residual against standardized predicted values. Inspection of the scatter plot raised concern as there appeared to be a pattern to the plots of data for all models, suggesting the possibility of variability of error and violation of the assumption for all models.

Mahalanobis distance values were examined to determine the presence of multivariate outliers. Overall, several Mahalanobis distance values were higher than the critical value of 24.32; however, large differences in values were not observed and the
data appeared relevant. That is, individuals for whom these values were computed likely made up the proportion of individuals who endorsed higher levels of psychological symptoms and alcohol use included in the study, setting them apart from those individuals who endorsed little to no symptoms or alcohol use. Therefore, these cases were retained and included in the hierarchical multiple regression analyses.

Finally, the assumptions of multivariate normality and linearity were examined. Histograms of the residuals were inspected to examine the presence of multivariate non-normality. The residuals for models 1, 8, 9, and 10 revealed multivariate normality. However, inspection of the histograms for the rest of the models revealed multivariate non-normality. Thus, the assumption of normality was violated for the majority of the models. The assumption of linearity was examined by inspecting the partial plots for all of the IVs (PCL-M, AUDIT, PHQ-D at baseline and 6-month follow up). Most of the plots demonstrated slightly curved relationships for all variables so linearity of the IV-DV relationship was not assumed and the assumption was violated.

The results of all of the following hierarchical multiple regression analyses conducted were nonsignificant. Thus, findings are inconsistent with all of the study hypotheses. Specific findings for each hierarchical multiple regression model are provided below.

**Cross-Sectional Models**

The following models tested hypotheses at the baseline time point and at the 6-month follow-up time point cross-sectionally.

**Within Soldiers.** Models 1 and 2 tested the hypotheses that the interaction among soldier PTSD symptoms, depression, and alcohol use at baseline would significantly
relate to soldier EE at baseline and soldier RAS at baseline separately. The models assessed the impact of soldier baseline AUDIT, PCL-M, and PHQ-D on soldier baseline FAS (n=122) and RAS (n=121) separately. Soldier PCL-M, PHQ-D, and AUDIT were entered into step 1 of each of the regression equations and did not exhibit significant main effects for either model (FAS: $R^2 = .04$, $F(3, 119) = 1.58$, $p = .20$; RAS: $R^2 = .02$, $F(3, 118) = .84$, $p = .48$). Then, 2-way interaction terms for each combination of PCL-M, PHQ-D, and AUDIT were entered in step 2, and all interaction effects were also nonsignificant (FAS: $R^2$ change=.04, $f^2$=.03, $F(6, 116) = 1.55$, $p = .20$; RAS: $R^2$ change=.02, $f^2$=.02, $F(6, 115) = .87$, $p = .52$). Finally, a 3-way interaction term (PCL-M x PHQ-D x AUDIT) was entered into step 3 and was also a nonsignificant predictor of soldier baseline FAS, $R^2$ change=.005, $f^2$=.01, $F(7, 115) = 1.41$, $p = .21$ and RAS, $R^2$ change=.002, $f^2$=.01, $F(7, 114) = .78$, $p = .61$ (See Tables 2 and 3).

Table 2

*The Interaction of Baseline Soldier PTSD Symptoms, Alcohol Use, and Depression as Predictors of Baseline Soldier Expressed Emotion*

<table>
<thead>
<tr>
<th>Step 1: Main Effects</th>
<th>$\beta$</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms</td>
<td>-.12</td>
<td>.04</td>
<td></td>
<td>.00</td>
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<tr>
<td>Depression</td>
<td>.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>.00</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2: Two-Way Interactions</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.03</td>
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<td>PTSD Symptoms X Alcohol Use</td>
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Table 2 (continued).

<table>
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<th>$R^2$ Change</th>
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</thead>
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<td>.08</td>
<td>.005</td>
<td>.01</td>
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<tr>
<td>PTSD Symptoms X Depression X Alcohol Use</td>
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</table>

Note: N = 122; Results were nonsignificant.

Table 3

*The Interaction of Baseline Soldier PTSD Symptoms, Alcohol Use, and Depression as Predictors of Baseline Soldier Relationship Satisfaction*

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<tr>
<th>Interaction</th>
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<th>$R^2$ Change</th>
<th>$f^2$</th>
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<td>PTSD Symptoms</td>
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<tr>
<td>Depression</td>
<td>.15</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Alcohol Use</td>
<td>-.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
<td></td>
<td>.04</td>
<td>.02</td>
<td>.02</td>
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<tr>
<td>PTSD Symptoms X Depression</td>
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<tr>
<td>PTSD Symptoms X Alcohol Use</td>
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<td></td>
</tr>
<tr>
<td>Alcohol Use X Depression</td>
<td>.05</td>
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<td></td>
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<tr>
<td><strong>Step 3: Three-Way Interaction</strong></td>
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<td>.05</td>
<td>.002</td>
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Table 3 (continued).

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<th>$R^2$ Change</th>
<th>$f^2$</th>
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</thead>
<tbody>
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<td>PTSD Symptoms X Depression X Alcohol Use</td>
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</tbody>
</table>

Note: N = 121; Results were nonsignificant.

Models 3 and 4 tested the hypotheses that the interaction among soldier PTSD symptoms, depression, and alcohol use at 6-month follow-up would significantly relate to soldier EE and relationship satisfaction at 6-month follow up. The models assessed the impact of soldier 6-month AUDIT, PCL-M, and PHQ-D on soldier 6-month FAS ($n=13$) and soldier 6-month RAS ($n=12$), respectively. Soldier PCL-M, PHQ-D, and AUDIT were entered into step 1 of the regression equations and did not exhibit significant main effects for either model (FAS: $R^2 = .16$, $F (3, 10) = .65$, $p = .60$; RAS: $R^2 = .15$, $F (3, 9) = .55$, $p = .66$). Then, 2-way interaction terms for each combination of PCL-M, PHQ-D, and AUDIT were entered in step 2 and all interaction effects were also nonsignificant (FAS: $R^2$ change=.05, $f^2 = .06$, $F (6, 7) = .32$, $p = .91$; RAS: $R^2$ change=.10, $f^2 = .13$, $F (6, 6) = .33$, $p = .90$). Finally, a 3-way interaction term (PCL-M x PHQ-D x AUDIT) was entered into step 3 and was also a nonsignificant predictor of soldier 6-month FAS, $R^2$ change=.01, $f^2 = .01$, $F (7, 6) = .24$, $p = .96$ and RAS, $R^2$ change=.02, $f^2 = .03$, $F (7, 5) = .27$, $p = .94$. (See Tables 4 and 5).
Table 4

The Interaction of Soldier PTSD Symptoms, Alcohol Use, and Depression at 6-Month Follow up as Predictors of Soldier Expressed Emotion at 6-Month Follow Up

<table>
<thead>
<tr>
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<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1: Main Effects</strong></td>
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<td></td>
<td></td>
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<tr>
<td>PTSD Symptoms at 6-Months</td>
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<tr>
<td>Depression at 6-Months</td>
<td>-.37</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Alcohol Use at 6-Months</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
<td></td>
<td>.21</td>
<td>.05</td>
<td>.06</td>
</tr>
<tr>
<td>PTSD Symptoms X Depression at 6-Months</td>
<td>.22</td>
<td></td>
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</tr>
<tr>
<td>PTSD Symptoms X Alcohol Use at 6-Months</td>
<td>.24</td>
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<tr>
<td>Alcohol Use X Depression at 6-Months</td>
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<tr>
<td><strong>Step 3: Three-Way Interaction</strong></td>
<td></td>
<td>.22</td>
<td>.01</td>
<td>.01</td>
</tr>
<tr>
<td>PTSD Symptoms X Depression X Alcohol Use at 6-Months</td>
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Note: N = 13; Results were nonsignificant.
Table 5

The Interaction of Soldier PTSD Symptoms, Alcohol Use, and Depression at 6-Month Follow up as Predictors of Soldier Relationship Satisfaction at 6-Month Follow Up

<table>
<thead>
<tr>
<th>Step 1: Main Effects</th>
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<th>R² Change</th>
<th>f²</th>
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<tr>
<td>Depression at 6-Months</td>
<td>.62</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use at 6-Months</td>
<td>.51</td>
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</table>

<table>
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<th>.10</th>
<th>.13</th>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>PTSD Symptoms X Alcohol Use at 6-Months</td>
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<tr>
<td>Alcohol Use X Depression at 6-Months</td>
<td>.62</td>
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<table>
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<tr>
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<th>.02</th>
<th>.03</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms X Depression X Alcohol Use at 6-Months</td>
<td>-.80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 12; Results were nonsignificant.

Between collateral reporters and soldiers. The fifth and sixth models tested the hypotheses that collateral reporter expressed emotion and relationship satisfaction at baseline would significantly relate to the interaction among soldier PTSD symptoms,
depression, and alcohol use at baseline, separately. The models separately assessed the impact of soldier baseline AUDIT, PCL-M, and PHQ-D on collateral reporter baseline FAS (n=12) and RAS (n=12). Soldier PCL-M, PHQ-D, and AUDIT were entered into step 1 of each of the regression equations and did not exhibit significant main effects for either model (FAS: R^2 = .00, F(3, 9) = .00, p = 1.00; RAS: R^2 = .01, F(3, 9) = .04, p = .99). Then, 2-way interaction terms for each combination of PCL-M, PHQ-D, and AUDIT were entered in step 2 and all interaction effects were also nonsignificant (FAS: R^2 change = .41, f^2 = .69, F(6, 6) = .70, p = .67; RAS: R^2 change = .51, f^2 = 1.11, F(6, 6) = 1.11, p = .45). Finally, a 3-way interaction term (PCL-M x PHQ-D x AUDIT) was entered into step 3 and was also a nonsignificant predictor of collateral reporter baseline FAS, R^2 change = .24, f^2 = .69, F(7, 5) = 1.35, p = .38 and RAS, R^2 change = .03, f^2 = .04, F(7, 5) = .89, p = .58 (See Tables 6 and 7).

Table 6

The Interaction of Baseline Soldier PTSD Symptoms, Alcohol Use, and Depression as Predictors of Baseline Collateral Reporter Expressed Emotion

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>R^2</th>
<th>R^2 Change</th>
<th>f^2</th>
</tr>
</thead>
<tbody>
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<td>PTSD Symptoms</td>
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<td></td>
</tr>
<tr>
<td>Depression</td>
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<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
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<td>.41</td>
<td>.41</td>
<td>.69</td>
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<td>PTSD Symptoms X Depression</td>
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<td>PTSD Symptoms X Alcohol Use</td>
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Table 6 (continued).

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<tr>
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<td>.65</td>
<td>.24</td>
<td>.69</td>
</tr>
<tr>
<td>PTSD Symptoms X Depression X Alcohol Use</td>
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Note: N = 12; Results were nonsignificant.

Table 7

*The Interaction of Baseline Soldier PTSD Symptoms, Alcohol Use, and Depression as Predictors of Baseline Collateral Reporter Relationship Satisfaction*

<table>
<thead>
<tr>
<th></th>
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<th>$R^2$</th>
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<th>$f^2$</th>
</tr>
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<tr>
<td>PTSD Symptoms</td>
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</tr>
<tr>
<td>Depression</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>-.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
<td></td>
<td>.53</td>
<td>.51</td>
<td>1.11</td>
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<tr>
<td>PTSD Symptoms X Depression</td>
<td>.09</td>
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<tr>
<td>PTSD Symptoms X Alcohol Use</td>
<td>.28</td>
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<tr>
<td>Alcohol Use X Depression</td>
<td>-.08</td>
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<tr>
<td><strong>Step 3: Three-Way Interaction</strong></td>
<td></td>
<td>.55</td>
<td>.03</td>
<td>.04</td>
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</tbody>
</table>
The seventh and eighth models were designed to test the hypotheses that collateral reporter expressed emotion and relationship satisfaction at 6-month follow up would significantly relate to the 3-way interaction among soldier PTSD symptoms, depression, and alcohol use at 6-month follow up, separately. However, influence statistics could not be computed for the following models because there were more predictors than subjects. Therefore, the aforementioned hypotheses could not be tested.

### Longitudinal Models

The following models tested hypotheses across the baseline time point and the 6-month follow-up time point longitudinally.

**Within soldiers.** Models 9 and 10 tested the hypotheses that soldier EE and relationship satisfaction, separately, at baseline would significantly relate to the 3-way interaction among soldier PTSD symptoms, depression, and alcohol use at 6-month follow up. The models assessed the impact of soldier 6-month AUDIT, PCL-M, and PHQ-D on baseline soldier FAS \( (n=27) \) and baseline soldier RAS \( (n=27) \) separately. Soldier 6-month PCL-M, PHQ-D, and AUDIT were entered into step 1 of the regression equations and did not exhibit significant main effects for either model (FAS: \( R^2 = .21, F (3, 24) = 2.10, p = .13 \); RAS: \( R^2 = .06, F (3, 24) = .53, p = .67 \)). Then, 2-way interaction terms for each combination of soldier 6-month PCL-M, PHQ-D, and AUDIT were entered in step 2, and all interaction effects were also nonsignificant (FAS: \( R^2 \))

Table 7 (continued).

<table>
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<tr>
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<th>( R^2 ) Change</th>
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Note: \( N = 12 \); Results were nonsignificant.
change = .01, \( f^2 = .00 \), \( F(6, 21) = .95, p = .48 \); RAS: \( R^2 \) change = .05, \( f^2 = .06 \), \( F(6, 21) = .44, p = .84 \). Finally, a 3-way interaction term (PCL-M x PHQ-D x AUDIT) was entered into step 3 and was also a nonsignificant predictor of soldier 6-month FAS, \( R^2 \) change = .04, \( f^2 = .05 \), \( F(7, 20) = .95, p = .49 \) and RAS, \( R^2 \) change = .03, \( f^2 = .03 \), \( F(7, 20) = .46, p = .85 \) (See Tables 8 and 9).

Table 8

The Interaction of Soldier PTSD Symptoms, Alcohol Use, and Depression at 6-Months Follow up as Predictors of Baseline Soldier Expressed Emotion

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>( R^2 )</th>
<th>( R^2 ) Change</th>
<th>( f^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1: Main Effects</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms at 6-Months</td>
<td>.21</td>
<td></td>
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<tr>
<td>Depression at 6-Months</td>
<td></td>
<td>-.03</td>
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<tr>
<td>Alcohol Use at 6-Months</td>
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<td>.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
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<td>.21</td>
<td>.01</td>
<td>.00</td>
</tr>
<tr>
<td>PTSD Symptoms X Depression at 6-Months</td>
<td></td>
<td>.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms X Alcohol Use at 6-Months</td>
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<td>-.56</td>
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<tr>
<td>Alcohol Use X Depression at 6-Months</td>
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<td>.58</td>
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<tr>
<td><strong>Step 3: Three-Way Interaction</strong></td>
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<td>.25</td>
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<td>.05</td>
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Table 8 (continued).

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<th>$R^2$ Change</th>
<th>$f^2$</th>
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<td>Depression X</td>
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<tr>
<td>Alcohol Use at 6-Months</td>
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</table>

Note: N = 27; Results were nonsignificant.

Table 9

The Interaction of Soldier PTSD Symptoms, Alcohol Use, and Depression at 6-Month Follow up as Predictors of Soldier Baseline Relationship Satisfaction

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<th>$R^2$ Change</th>
<th>$f^2$</th>
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<tr>
<td>Depression at 6-Months</td>
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<td></td>
</tr>
<tr>
<td>Alcohol Use at 6-Months</td>
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<table>
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<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
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<tbody>
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</tr>
<tr>
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</tr>
<tr>
<td>Depression at 6-Months</td>
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<td>PTSD Symptoms X</td>
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<tr>
<td>Alcohol Use at 6-Months</td>
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<tr>
<td>Alcohol Use X</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Depression at 6-Months</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Step 3: Three-Way Interaction</strong></th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression at 6-Months</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use X</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Depression at 6-Months</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note: $R^2$ Change and $f^2$ values indicate the change in variance explained and the effect size, respectively.
Table 9 (continued).

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms X Depression X Alcohol Use at 6-Months</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $N = 27$; Results were nonsignificant.

Models 11 and 12 tested the hypotheses that the 3-way interaction among soldier PTSD symptoms, depression, and alcohol use at baseline would significantly relate to soldier EE and relationship satisfaction at 6-month follow up. The models assessed the impact of soldier baseline AUDIT, PCL-M, and PHQ-D on 6-month follow up soldier FAS ($n=13$) and 6-month follow up soldier RAS ($n=12$), respectively. Soldier baseline PCL-M, PHQ-D, and AUDIT were entered into step 1 of the regression equations and did not exhibit significant main effects for either model (FAS: $R^2 = .13$, $F (3, 10) = .50$, $p = .69$; RAS: $R^2 = .17$, $F (3, 9) = .63$, $p = .61$). Then, 2-way interaction terms for each combination of baseline PCL-M, PHQ-D, and AUDIT were entered in step 2, and all interaction effects were also nonsignificant (FAS: $R^2$ change$=.25$, $f^2 = .40$, $F (7, 5) = .72$, $p = .65$; RAS: $R^2$ change$=.35$, $f^2 = .73$, $F (6, 6) = 1.09$, $p = .46$). Finally, a 3-way interaction term (PCL-M x PHQ-D x AUDIT) was entered into step 3 and was also a nonsignificant predictor of soldier 6-month FAS, $R^2$ change$=.24$, $f^2 = .63$, $F (7, 6) = 1.41$, $p = .34$ and RAS, $R^2$ change$=.28$, $f^2 = 1.4$, $F (7, 5) = 2.87$, $p = .13$ (See Tables 10 and 11).
Table 10

The Interaction of Soldier Baseline PTSD Symptoms, Alcohol Use, and Depression as Predictors of Soldier Expressed Emotion at 6-Month Follow Up

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
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<td>PTSD Symptoms</td>
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<tr>
<td>Depression</td>
<td>-.59</td>
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<td></td>
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</tr>
<tr>
<td>Alcohol Use</td>
<td>-.15</td>
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<td></td>
</tr>
<tr>
<td><strong>Step 2: Two-Way Interactions</strong></td>
<td>.38</td>
<td>.25</td>
<td>.40</td>
<td></td>
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<tr>
<td>PTSD Symptoms X Depression</td>
<td>1.00</td>
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<td></td>
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<tr>
<td>PTSD Symptoms X Alcohol Use</td>
<td>-1.25</td>
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<tr>
<td>Alcohol Use X Depression</td>
<td>-.19</td>
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<tr>
<td><strong>Step 3: Three-Way Interaction</strong></td>
<td>.62</td>
<td>.24</td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms X Depression X Alcohol Use</td>
<td>1.11</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 13; Results were nonsignificant.

Table 11

The Interaction of Soldier PTSD Symptoms, Alcohol Use, and Depression at Baseline as Predictors of Soldier Relationship Satisfaction at 6-Month Follow Up

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1: Main Effects</strong></td>
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<td>.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11 (continued).

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>.30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 2: Two-Way Interactions**

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms X Depression</td>
<td>-1.41</td>
<td>.52</td>
<td>.35</td>
<td>.73</td>
</tr>
<tr>
<td>PTSD Symptoms X Alcohol Use</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use X Depression</td>
<td>.39</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Step 3: Three-Way Interaction**

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Beta</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Symptoms X Depression X</td>
<td>-1.18</td>
<td>.80</td>
<td>.28</td>
<td>1.40</td>
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<tr>
<td>Alcohol Use</td>
<td></td>
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</tbody>
</table>

Note: N = 12; Results were nonsignificant.

*Between collateral reporter and soldiers.* The thirteenth and fourteenth models were designed to test the hypotheses that the 3-way interaction among soldier alcohol use, PTSD symptoms, and depression at baseline would significantly relate to collateral reporter expressed emotion and relationship satisfaction at 6-month follow up. The fifteenth and sixteenth models were designed to test the hypotheses that collateral reporter expressed emotion and relationship satisfaction at baseline, separately, would significantly relate to the 3-way interaction among soldier PTSD symptoms, depression, and alcohol use at 6-month follow up. However, again, influence statistics could not be
computed for the aforementioned models because there were more predictors than subjects. Therefore, the previously stated hypotheses could not be tested.
CHAPTER IV
DISCUSSION

The purpose of the present investigation was to examine the relation of both collateral reporter and soldier expressed emotion and relationship satisfaction (each examined separately) on salient empirically indicated correlates of PTSD in military personnel, including PTSD symptoms themselves, depression, and alcohol use. The study aimed to provide a more thorough understanding of the relation between military personnel and their identified close others in an effort to assist mental health providers in choosing the most appropriate treatment possible and to potentially identify new targets for treatment.

Consistent with expected results, findings of cross-sectional correlation analyses indicated that higher EE (i.e., more critical and hostile) collateral reporters experience lower satisfaction regarding their relationship with the soldier. The finding is consistent with previous research indicating a link between EE and relationship satisfaction in close others of those with depression (Hooley & Teasdale, 1989). Similarly, cross-sectional correlational findings also indicated that higher EE (i.e., more critical and hostile) soldiers experience lower satisfaction with the relationship with their identified collateral reporter at both baseline and six months later.

Contrary to what would be expected, collateral reporter EE and collateral reporter relationship satisfaction were not found to be significantly associated with soldier EE or relationship satisfaction cross-sectionally. Findings suggested that higher criticism and hostility in collateral reporters were not associated with higher criticism and hostility in the soldiers. In addition, collateral reporter perception of relationship satisfaction was not
associated with relationship satisfaction as reported by the soldier. Higher criticism and hostility in the collateral reporter was not associated with lower relationship satisfaction as perceived by the soldier or vice versa.

Within the soldier, cross-sectional correlational findings indicated that higher depression was associated with more problematic alcohol use at baseline, higher PTSD symptoms were associated with more problematic alcohol use at baseline and at the 6-month follow up, and higher PTSD symptoms were associated with higher depression in soldiers at baseline and at the six month follow up, cross-sectionally. These results are consistent with previous research indicating that PTSD symptoms, alcohol use, and depression commonly co-occur in military personnel (Meyer et al., 2011).

Consistent with prediction, longitudinal correlational analyses also indicated that higher PTSD symptoms, depression, and alcohol use at baseline were associated with higher PTSD symptoms, depression, and alcohol use six months later, respectively. Results suggest that PTSD symptoms, depression, and alcohol use are stable over time and may represent a point of intervention. In addition, findings indicated that, in soldiers, higher PTSD symptoms at baseline were associated with higher depression symptoms six months later, and higher depression symptoms at baseline were associated with higher PTSD symptoms 6-months later. These results, coupled with the correlational findings that both PTSD and depression were associated at both baseline and at the 6-month follow up time point, may be consistent with previous research indicating that PTSD and depression share common risk factors (Stander et al., 2014). However, more fine grained analyses would be needed to further clarify the relationship.
Longitudinal correlation analyses also revealed statistically significant positive associations between soldier EE at baseline and soldier EE at 6-month follow up and soldier relationship satisfaction at baseline and soldier relationship satisfaction at 6-month follow up. The aforementioned findings suggest that EE and relationship satisfaction, much like soldier symptoms, are stable over time. Further results suggested that higher soldier EE may lead to lower relationship satisfaction over time. These results may be consistent, at least in part, with previous longitudinal research supporting the erosion model such that higher criticism and hostility may lead to decreased social support and thus, lower satisfaction with their relationship (King et al., 2006). As such, high EE in soldiers may serve as a target for treatment and/or as an indicator that therapeutic intervention is needed for soldiers and their collateral reporters.

Also in contrast to predicted results, cross-sectional multiple regression analyses examining study variables across both collateral reporters and soldiers at baseline indicated that the interaction among soldiers’ PTSD symptoms, depression, and alcohol use at baseline was not statistically significantly related to collateral reporter EE or relationship satisfaction at baseline. However, Cohen’s $f^2$ effect size estimates were moderate in these models, suggesting the addition of interaction terms explained more variance in the overall model. The cross-sectional models examining the effect of collateral reporter EE and relationship satisfaction at 6-month follow up on soldier symptoms at 6-month follow up could not be tested due to low sample size. Within the soldiers, cross-sectional regression results indicated that the interaction among soldiers’ PTSD symptoms, depression symptoms, and alcohol use at baseline were also not significantly related to their own EE or relationship satisfaction at baseline. A large
portion of the sample of soldiers recently returned to the U.S. Therefore, not enough time may have passed for EE and relationship satisfaction in both collateral reporters and soldiers to have been impacted by the soldier’s symptoms. However, similar results were obtained when examining these constructs cross-sectionally at the 6-month follow up time point. Although, the sample size for these analyses was small (n=13) and a larger sample may have produced different findings.

The primary longitudinal hypotheses of the present study were unable to be tested due to significant sample size limitations. Therefore, based on the results of the current study, it remains unclear whether collateral reporter EE and relationship satisfaction (examined separately) at baseline would affect and/or predict the interaction of soldier PTSD symptoms, depression, and alcohol use at 6-month follow up. It is also unknown whether the interaction of soldier PTSD symptoms, depression, and alcohol use at baseline would predict collateral reporter EE and relationship satisfaction (examined separately) six months later.

Longitudinal hierarchical multiple regression results within the soldier data indicated that soldier EE and relationship satisfaction at baseline were not related to the interaction of soldier PTSD symptoms, depression, and alcohol use at 6-month follow up which is inconsistent with hypothesis. Regression results also indicated that the soldier EE and relationship satisfaction at 6-month follow up was not related to the interaction of soldier PTSD symptoms, depression, and alcohol use at baseline. However, effect size estimates for the change in variance explained from step 1 to step 2 and from step 2 to step 3 for models 12 and 13 were moderate to very large. In addition, the results of model 13 was trending toward significance (p = .13) and the standardized betas were in the
expected direction. Taken together, these results suggest that with a larger sample size, expected effects may have been revealed.

Limitations and Future Directions

The results of the present study should be considered in the context of a number of limitations. One significant limitation of the present study was the varied and, depending on analyses, extremely small sample size. Given the incredibly low sample size, there may have been a lack of variability in scores on the measures where increased variability may have been seen in a more representative sample. Also, due to extremely low sample sizes at the 6-month follow up time point, in particular, especially for collateral reporters, a number of analyses could not be conducted due to a lack of power and, thus, many hypotheses could not be tested. Future studies should re-investigate the cross-sectional and longitudinal associations among soldier EE, relationship satisfaction, PTSD symptoms, depression, and alcohol use, and collateral reporter EE and relationship satisfaction using a larger matched sample. An increased emphasis should be placed on recruitment of the soldier/collateral reporter dyad and employing methods to increase the likelihood of participation and compliance with study procedures by both parties. For example, monetary incentives or in person interactions with research personnel where the soldier and their collateral reporter are both present may assist with reducing attrition rates and ensuring study completion.

However, certain of the analyses conducted possessed an adequate sample size, particularly the correlations and hierarchical regression models conducted within soldier data. For instance, the model testing whether the interaction among soldier PTSD symptoms, depression, and alcohol use at baseline would predict soldier EE at baseline
and soldier RAS at baseline separately had a sample size of 121-122. For such analyses, results may have been impacted by uncontrolled and/or unmeasured third variables. The results of these analyses may also have been impacted by the manner in which EE was measured.

Another significant limitation of the study was the manner in which EE was measured in soldiers. Hypotheses were based on soldiers’ perceptions of the level of EE of the collateral reporter. However, due to researcher error, level of the soldier’s own EE toward the collateral reporter was the construct that was measured. It is expected that the current study results would have been consistent with hypotheses across collateral reporter and soldier had the soldier’s perceptions of collateral reporter EE been measured. Therefore, future studies should assess the impact of the soldiers’ perception of the collateral reporters EE on relationship satisfaction, PTSD symptoms, depression, and alcohol use, and collateral reporter EE and relationship satisfaction longitudinally.

An additional limitation of the current study was the sole use of self-report questionnaires primarily administered via computer to measure study constructs which can introduce bias due to misunderstanding, technical difficulties, and/or impression management. Attempts were made in the informed consent process to reduce impression management by indicating that survey responses would be confidential and collected via private Internet hot spots. Future research studies may also examine hypotheses using updated assessment instruments and differing methods of assessment. For example, studies may utilize the Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5 (Weathers, Litz et al., 2013) to measure PTSD symptoms and/or the Clinician Administered PTSD Scale for DSM-5 interview (Weathers, Blake et al., 2013) to
replicate and extend the findings of the current study. Studies may also investigate these hypotheses using the EE measurement gold standard, the Camberwell Family Interview (Kavanagh et al., 1997, 2008), to ascertain whether results are consistent with those found using a self-reported EE via the FAS. Given previous research findings on EE, isolating hostile content via the FAS, or another instrument measuring EE, may allow for more precise measurement of any EE effect that might be present (Barrowclough et al., 2008; Miklowitz, 2004).

In addition, the study sample was limited to Army personnel, reducing generalizability of results to other branches of the military as well as Veterans. The small sample size of the study also prevented investigation of differences across gender, sexual orientation, type of relationship with collateral reporter (e.g., spouse, parent, friend, etc.), time since deployment, and across culture. Future studies may investigate these constructs in other branches of the military, including the Navy, Air Force, Marines, and Coast Guard, and in Veterans who are no longer active duty. Future research should also compare findings across gender, sexual orientation, type of relationship, time since deployment, and race/ethnicity.

Despite the limitations of the present study, results revealed a significant relationship between EE and relationship satisfaction in both soldiers and in those with whom they have close relationships as well as significant associations among PTSD symptoms, alcohol use, and depression in soldiers. The findings of the study highlight the importance of a robust research design, especially recruitment of the dyad in studies examining the impact of constructs on both soldiers and their identified close others. Further research is needed to understand the relationship among EE and relationship
satisfaction in both soldiers and collateral reporters, and PTSD symptoms, depression, and alcohol use in soldiers. Implications of such findings would aid in the development of innovative treatments and potential new targets for treatment, and thereby would reduce negative emotional and behavioral outcomes for both parties.
APPENDIX A

INSTITUTIONAL REVIEW BOARD NOTICE OF COMMITTEE ACTION

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Effect Report Form”.
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 13060602
PROJECT TITLE: Identifying Factors Associated with Future Suicidal Self-Directed Violence within a Sample of Mississippi National Guard Personnel
PROJECT TYPE: New Project
RESEARCHER(S): Michael Anestis
COLLEGE/DIVISION: College of Education and Psychology
DEPARTMENT: Psychology
FUNDING AGENCY/SPONSOR: Military Suicide Research Consortium
IRB COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 6/10/2013 to 6/09/2014

Lawrence A. Hosman, Ph.D.
Institutional Review Board
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doi: 10.1002/jts.20304


doi:10.1016/j.genhosppsych.2010.03.006


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