Published in final edited form as:

J Psychopathol Behav Assess. 2018 June ; 40(2): 334–343. doi:10.1007/s10862-017-9629-3.

Heterogeneity in the Strength of the Relation Between Social Support and Post-Trauma Psychopathology

Matthew Price¹, Sarah Pallito¹, and Alison C. Legrand¹

¹Department of Psychological Science, University of Vermont, 2 Colchester Avenue, Burlington, VT 05405, USA

Abstract

Potentially traumatic events (PTEs) increase risk for psychopathology, including posttraumatic stress disorder (PTSD), major depressive disorder (MDD), and generalized anxiety disorder (GAD). Social support (SS) is associated with reduced symptoms for each disorder. Each disorder, however, is highly heterogeneous such that they are comprised of clusters of different symptoms. It is unclear if SS is associated with all clusters equally. The current study examined the relation between SS and the symptom clusters of each disorder. Participants completed a battery of self-report assessments for PTSD, MDD, GAD, and SS. All participants experienced a Criterion A traumatic event. Although SS was significantly associated with all symptom clusters, the strength of relations varied. The relation between SS and MDD-affective was significantly stronger than its association with all other factors. The relations between SS and GAD, MDD-somatic, PTSD-AAR, and PTSD-NACM did not significantly differ. These relations were stronger than the relations between SS and the remaining PTSD factors. There was no significant difference in the relations between SS and PTSD-intrusions or PTSD-avoidance. These results suggest that SS is more closely aligned to specific aspects of post-trauma psychopathology.

Keywords

PTSD; Social support; Major depression; Generalized anxiety disorder

Exposure to a potentially traumatic event (PTE) substantially increases the risk for mental health disorders including post-traumatic stress disorder (PTSD), major depressive disorder (MDD), and generalized anxiety disorder (GAD) (Bryant et al. 2010; Kilpatrick et al. 2013; Zatzick et al. 2007). Not all individuals who experience a PTE, however, develop such conditions. The range of post-trauma outcomes, from resilience to psychopathology, suggest that there are several factors that affect recovery. Social support is proposed as one of the

Correspondence to: Matthew Price.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Matthew Price, Sarah Pallito, and Alison Legrand declare that they have no conflict of interest.

Experiment Participants All participants provided informed consent and this research study was conducted in compliance the standards of the Institutional Review Board.

strongest factors that protects against negative outcomes after a PTE, although there is evidence that this relation is bidirectional (Fredman et al. 2017). Social support is defined as the perceived empathy and emotional care that an individual receives from friends, family, or a significant other (Ullman and Filipas 2001). Numerous studies have supported the strength of the protective effect of social support across multiple PTE types, including victims of domestic violence, veterans of war, and those who experienced natural disasters (Dai et al. 2016; Pietrzak et al. 2009; Woodward et al. 2015). Each of these disorders is heterogeneous, however, in that they contain multiple symptoms that are clustered into factors. It is unclear if social support has a consistent protective effect across all factors of these disorders.

Considerable work has shown that there is negative relation between social support and PTSD, MDD, and GAD symptoms. A large meta-analysis of protective and risk factors for PTSD identified social support as the strongest protective factor as well as the second overall most important factor associated with the onset of PTSD, behind peritraumatic distress (Ozer et al. 2003). Similar results were found in a survey of recently returning combat veterans in that increased social support was associated with reduced PTSD symptom severity (Pietrzak et al. 2009). In a sample of 321 individuals diagnosed with PTSD following a flood, 51 participants still met criteria for PTSD in a 13-year follow up. Those who met criteria for PTSD reported lower levels of social support, indicating a relation between increased social support and recovery from a PTE (Dai et al. 2016). Those with depression reported significantly lower levels of social support than controls after a PTE (Kwako et al. 2011). Combat veterans who reported elevated social support from their unit and from their post deployment network reported less severe depression symptoms (Pietrzak et al. 2010). Although less studied, evidence suggests social support is negatively related to GAD. In a sample of spouses of returning military veterans, social support was significantly lower among those who had GAD (Fields et al. 2012). Similar findings were reported in a sample of women diagnosed with breast cancer in that higher partner support was correlated with lower levels of generalized anxiety (Borstelmann et al. 2015).

Much of the extant literature on social support and post trauma psychopathology has not accounted for comorbidity. PTSD, MDD, and GAD are highly comorbid with estimates ranging from 48% to 55% for PTSD and MDD, 15% to 17% for PTSD and GAD, and approximately 60% for MDD and GAD (Elhai et al. 2008; Kessler et al. 2005). There are several proposed theories for this comorbidity. One such theory suggests that it results from shared variance in the theoretical latent factors that underlie these disorders. MDD has two factors that reflect an affective component (MDD-affective) and a somatic component (MDD-somatic) (Contractor et al. 2014; Elhai et al. 2015; Tsai et al. 2014). GAD reliably is comprised of a single factor (Durham et al. 2015; Price and van Stolck-Cooke 2015; Spitzer et al. 2006). The factor of structure of PTSD is fairly complex with an extensive literature devoted to its components (for a review see Armour et al. 2016). The DSM 5 defines PTSD across four factors: PTSD-intrusions, PTSD-avoidance, negative alterations in cognitions and mood (PTSD-NACM), and alterations in arousal and reactivity (PTSD-AAR) (American Psychiatric Association 2013). Although the factor structure of PTSD remains under investigation, this structure has been supported and will be used in the current study (Byllesby et al. 2016a; Miller et al. 2013; Price and van Stolck-Cooke 2015).

The cause for this comorbidity has implications for understanding how external constructs, such as social support, exert their effects. Theorists have proposed that the high comorbidity among these disorders is attributed to underlying dimensional factors (Barlow et al. 2014; Brown and Barlow 2009; Slade and Watson 2006; Watson 2009). Watson's quadripartite model (2009) proposes that psychopathology is quantified by a symptom's level of general distress and specificity. General distress is defined primarily as negative affect whereas specificity is defined as symptoms that are distinct from negative affect (e.g., stimulus-specific fear). Considerable prior work has shown that there are strong relations between the factors of PTSD, MDD, and GAD, which implies that these disorders have a strong association to a general distress factor and relatively low specificity (Byllesby et al. 2016b; Durham et al. 2015; Elhai et al. 2015; Price and van Stolk-Cooke 2015). Indeed, two studies with combat veterans have suggested that comorbidity may reflect increased severity of symptoms as opposed to unique disorders (Contractor et al. 2015; Gros et al. 2012), which points to the presence of an underlying shared distress factor. An alternative theory proposes that the symptoms of such disorders comprise a connected network that interact with one another (Borsboom and Cramer 2013). Using this perspective, comorbidity results from a set of causal relations between the symptoms that feed into one another, resulting in multiple disorders. The present study will focus on the underlying dimensional factors approach as it has received more attention in the empirical literature thus far, however other approaches have generated considerable promise (Borsboom et al. 2011; McNally et al. 2015).

Several studies have demonstrated significant and meaningful relations among the factors of PTSD, MDD, and GAD. There are a number of studies that have supported these relations using DSM IV criteria (Byllesby et al. 2016b; Contractor et al. 2014; Durham et al. 2015; Elhai et al. 2015; Grant et al. 2008). Results from studies that have used the DSM 5 criteria are reviewed here. An examination of the association between the factors of PTSD, GAD, and the factors of MDD suggested that the affective MDD factor was most strongly related to PTSD-NACM (Price and van Stolk-Cooke 2015). MDD-somatic, PTSD-AAR, and GAD were more strongly related. The correlations among the other factors were significant, but notably weaker. Interestingly, this study also examined the fit of a general distress model in which each symptom loaded on a single latent factor. This model demonstrated poor fit, however, which suggests that there is specificity across these factors. A second study examined the impact of negative affect on the relation between each of these disorders (Byllesby et al. 2016a). The factors of PTSD, MDD, and GAD were highly correlated in an initial model. When negative affect was included in the model, the associations between PTSD-NACM, the MDD-affective, and GAD decreased. Furthermore, the correlations between PTSD-intrusions, PTSD-avoidance, and PTSD-AAR did not significantly change.

These data suggest that the factors of MDD, PTSD-NACM and PTSD-AAR, and the GAD factor are more strongly related. There are important nuances in these relations, however. MDD-affective and PTSD-NACM were more strongly related, which may reflect an affective component of general distress. Similarly, MDD-somatic, PTSD-AAR, and GAD may reflect an arousal element of general distress. Finally, the PTSD-intrusions and PTSD-avoidance factors may reflect a trauma-specific component as was suggested in theories on the response to stressful events (Brewin et al. 1996; Horowitz 2011). This arrangement provides the foundation for an empirical investigation into the association between these

dimensions and social support. If the relation between affect, arousal, and trauma-components have similar relations to social support, it would provide further information about the structure of this psychopathology and give clues as to how social support is associated with these symptoms.

The current study aimed to examine the relation between social support and the factors of PTSD, MDD, and GAD. Social support is proposed to be associated with reduced psychopathology because it improves mood and elevates self-compassion (Kessler et al. 1985; Maheux and Price 2016; Ozbay et al. 2007). Therefore, social support is hypothesized to have stronger negative relations with factors that are most closely aligned with an affective component (PTSD-NACM, MDD-affective). It is hypothesized that the next strongest relations will be among those with an arousal component (PTSD-AAR, MDD-somatic, GAD). Social support is hypothesized to reduce arousal by creating a supportive context that diminishes reactivity to stressful stimuli. Finally, it is hypothesized that the weakest relations will be among those components that are trauma-specific (PTSD-intrusions, PTSD-avoidance) as these are thought to reflect trauma-specific symptoms.

Methods

Participants

All participants ($N = 712$) experienced a Criterion A event according to the DSM 5 PTSD diagnosis. Recruitment occurred through Amazon's Mechanical Turk (MTurk). MTurk is a viable method to collect high quality clinical data (Shapiro et al. 2013). A majority were female ($n = 392$, 55.6%) and self-identified as White ($n = 519$, 72.9%). The remaining participants self-identified as Hispanic-White ($n = 49$, 6.9%), Hispanic-African American ($n = 4$, 0.6%), African American ($n = 47$, 6.6%), Asian ($n = 67$, 9.4%), and Other ($n = 26$, 3.6%). The sample was predominately single ($n = 327$, 45.9%) or married ($n = 224$, 31.5%) with a small number of participants reporting they were cohabiting with a partner ($n = 109$, 15.3%), divorced ($n = 33$, 4.6%), separated ($n = 5$, 0.7%) or widowed ($n = 2$, 0.3%). The average age of participants was $M = 32.30$, $SD = 10.90$. Informed consent was obtained from all individual participants included in the study.

Measures

Life Events Checklist-5 (LEC-5; Weathers et al. 2013a)—The LEC-5 is a 17-item self-report measure that assesses exposure to PTEs across one's life span. Participants are asked to report exposure to 16 PTEs, with an additional item included to assess exposure to other extraordinary stressful events. The present study utilized the extended version of the LEC that pertained to the DSM 5 definition of a trauma, in which participants were asked to describe their worst PTE.

PTSD Checklist-5 (PCL-5; Weathers et al. 2013b)—The PCL-5 is a 20-item self-report measure that assesses PTSD symptoms experienced over the last month according to the DSM 5 criteria. Items assess symptoms across the 4 symptom clusters of PTSD (intrusions, avoidance, NACM, AAR) on a 0–4 point Likert scale. Total scores range from 0

to 80. Internal consistency for the PCL-5 in the current sample was excellent, Cronbach's $\alpha = .95$.

Patient Health Questionnaire-8 (PHQ-8; Kroenke et al. 2009)—The PHQ-8 is an 8-item self-report measure that assesses depression symptoms experienced over the past two weeks. Ratings are made on a 0–3 point Likert scale regarding the frequency a symptom has been experienced. Scores range from 0 to 24, with higher scores indicating more severe depression. The PHQ-8 is adapted from the PHQ-9 and is identical except for the removal of an item on suicidal ideation. This item was excluded because the research team was unable to provide appropriate intervention in the event a participant identified themselves as high risk. Internal consistency for the PHQ-8 in the current sample was excellent, Cronbach's $\alpha = .91$.

Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al. 2006)—The GAD-7 is a 7-item self-report measure that assesses GAD symptoms experienced over the past two weeks. Ratings are made on a 0–3 point Likert scale with scores ranging from 0 to 21. Higher scores correspond to more severe anxiety symptoms. Internal consistency for the GAD-7 in the current sample was excellent, Cronbach's $\alpha = .92$.

The Multidimensional Scale of Perceived Social Support (MSPSS: Zimet et al. 1988)—The MSPSS is a 12-item self-report measure used to assess perceived social support from friends, family, and significant other. Ratings were made on a 7-point Likert scale ranging from 1 to 7 with higher scores indicating more social support. Internal consistency for the MSPSS in the current sample was excellent, Cronbach's $\alpha = .95$.

Procedure

A Human Intelligence Task (HIT) was posted to MTurk seeking participants to complete questionnaires assessing the impact of stressful events on their lives under the keywords: survey, stress, gender, women/men, and health. A total of 950 HITs were made available to MTurk workers, with half allocated to each gender. The HIT was available to those on an IP address located in the U.S. and had an 80% prior HIT success rate (defined by requesters accepting a previous worker's HIT and receiving compensation). Participants were given 1 h to complete all measures. The LEC was completed first and participants who did not endorse a potentially traumatic event were notified that they were ineligible. Embedded within the measures were 5 validity checks to ensure participants provided valid responses (e.g., For this item, please select "5"). A valid case is defined as answering at least 4 of these responses correctly and having spent more than 5 min to complete the HIT in its entirety. These strategies have been shown to increase the validity of survey data collected from Mturk (Paolacci and Chandler 2014; Paolacci et al. 2010). These screening methods excluded 238 respondents. Measures were tailored to a specific PTE that was identified via the LEC.

Data Analysis

Analyses involved several steps. First, a confirmatory factor analysis (CFA) evaluated the fit of the factor structure of PTSD symptoms as per the DSM 5. A second CFA determined the

optimal factor structure of MDD between a 2-factor model (somatic and affective) and a 1-factor model. Another CFA evaluated the fit of a 1-factor model of GAD. Finally, the latent psychopathology factors were regressed on social support and the relations were compared using Wald Chi-Square Tests. This analysis evaluated the null hypothesis that the relation between two variables is equivalent, whereas a significant result suggests the relation differs. A multi-comparison correction $\alpha = .00625$ was used to account for the 8 comparisons.

The primary analyses were conducted with Mplus 7.11 (Muthen and Muthen 2012). Factor variances were scaled to 1 and residual error covariances set to zero. The current models used item-level scales that are ordinal as opposed to continuous. Prior work has indicated that treating these data as ordinal yields solutions with a better fit (Elhai et al. 2015, 2011). Models of each disorder were estimated using a polychoric covariance matrix, robust weighted least squares estimation with a mean-and-variance adjusted chi-square (WLSMV) and probit regression coefficients (Flora and Curran 2004). WLSMV is a robust estimation method that does not assume multivariate normality, which is preferred when working with ordinal data (Brown 2015). Model fit was evaluated using the guidelines of Hu and Bentler (1999). Excellent fit is defined as having a Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) $\geq .95$, and a root mean square error of approximation (RMSEA) value $\leq .06$. Adequate fit is defined as having a Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) $\geq .90$, and a root mean square error of approximation (RMSEA) value $\leq .10$. Model comparisons were conducted using the Bayesian Information Criterion (BIC) and Maximum Likelihood with a robust estimator (MLR) estimation for categorical variables, as this information is not obtained with WLSMV. A 10-point difference in BIC provides very strong support that the model with the lower BIC value fits best (Kass and Raftery 1995). Model comparisons were conducted using the BIC because these models are non-nested. Missing data was present on 1.73% of the items and all participants provided responses to some of the questions. Missing data was handled with full information maximum likelihood estimation.

Results

The type of PTEs endorsed by the current sample are reported in Table 1. Participants endorsed direct exposure to $M = 2.69$, $SD = 2.01$ types of PTEs with the majority of the sample (64.0%) directly experiencing between 1 and 3 types of PTEs in their lifetime. The current sample had a mean total score on the PCL-5 of $M = 20.15$, $SD = 18.27$ with 23.00% of the sample having likely PTSD using the cut-off score of 33 (Weathers et al. 2013b). Total scores for the PHQ-8 were $M = 6.88$, $SD = 5.93$ with 31.6% meeting likely criteria for moderate depression (PHQ-8 score greater than 9). Total scores for the GAD-7 were $M = 6.27$, $SD = 5.55$ with 25.3% meeting likely criteria for moderate anxiety (GAD-7 score greater than 9). Comorbidity was common in that among those who likely had a diagnosis, 34.86% likely had 1 diagnosis, 29.93% likely had 2 diagnoses, and 35.21% likely had 3 diagnoses.

The PTSD factor structure was evaluated first. An initial CFA evaluated the fit of the DSM 5 model, which fit the data well, $\chi^2(190) = 26,676.00$, $p < 0.001$, CFI = 0.975, TLI = 0.971, RMSEA = 0.076, 90% CI [0.070, 0.081]. A 2-factor solution for depression fit the data well,

$\chi^2(19) = 76.66, p < 0.001$, CFI = 0.994, TLI = 0.991, RMSEA = 0.065, 90% CI [0.050, 0.081], BIC = 12,528.974. Although a 1-factor solution also fit well, ($\chi^2(20) = 124.796, p < 0.001$, CFI = 0.989, TLI = 0.985, RMSEA = 0.086, 90% CI [0.072, 0.101], BIC = 12,570.189), the difference in BIC scores (41.22) suggested that the 2-factor solution was optimal. The 1-factor solution for GAD fit the data well, $\chi^2(14) = 113.624, p < 0.001$, CFI = 0.994, TLI = 0.991, RMSEA = 0.100, 90% CI [0.083, 0.117]. Finally, a combined model that included all latent variables for PTSD, MDD, and GAD demonstrated excellent fit, $\chi^2(567) = 1878.86, p < 0.001$, CFI = 0.965, TLI = 0.961, RMSEA = 0.057, 90% CI [0.054, 0.060] (Tables 2, 3). Social support was then introduced as an observed variable with paths to each of the latent factors (Table 4).

A series of Wald χ^2 tests indicated that there was significant variability in the strength of the relations between social support, PTSD, MDD, and GAD (Table 5). The relation between social support and MDD-affective was stronger than its relation to all other factors (p 's < .001). The strength of the relation between social support and MDD-somatic, GAD, PTSD-NACM, and PTSD-AAR did not significantly differ using the corrected α ($p = .16-.02$). Finally, PTSD-intrusions and PTSD-avoidance had relations to social support that were significantly weaker than all other factors (p 's < .001).

Discussion

The results of the present study reaffirm the finding of multiple prior investigations that social support is negatively related to post-trauma psychopathology. These findings were extended by demonstrating that the strength of this relation varies across different factors of post-trauma mental health. The findings were mostly consistent with the proposed hypotheses. The factors with the strongest relations to one another (PTSD-NACM, PTSD-AAR, GAD, MDD-affective, and MDD-somatic) were most strongly related to social support. The hypothesis that factors associated with a common affective component (MDD-affective, and PTSD-NACM) would have the strongest relation to social support was partially supported. MDD-affective had the strongest relation to social support relative to all other factors. PTSD-NACM was included in the set of factors with the second strongest set of relations to social support. Finally, PTSD intrusions and PTSD avoidance symptom clusters were found to have the weakest relative relation to social support. This finding is consistent with other work that has shown these two factors may reflect trauma-specific dimension of psychopathology (Price and van Stolk-Cooke 2015).

The pattern of relations between the results of the present study and prior work provide further support for common components among these disorders. The significant relations between all the examined factors and social support highlight their theorized association to a common underlying general distress dimension as in the quadripartite model (Watson 2009). Studies that have examined aggregated models, in which symptoms are collapsed into fewer or a single factor, have reported poorer fit than models in which each factor is separated (Grant et al. 2008; Price and van Stolk-Cooke 2015). The variability in the strength of the relation between social support and each factor further suggests that these factors reflect different, albeit highly correlated, dimensions of psychopathology. The relation between affective depression and social support, and the arousal factors, as shown by the comparable

relations between factors that contain physiological symptoms (PTSD-AAR, GAD, MDD-somatic) tentatively support the mood and arousal factors consistent with the quadripartite model. The arousal factor may indicate more than arousal given that GAD, PTSD-NACM and PTSD-AAR include multiple symptoms of worry and other cognitive constructs. Others have suggested that these factors may represent a broader misery factor (Slade and Watson 2006), but additional work is needed to evaluate this hypothesis. The intrusion and avoidance factors, which had significantly weaker relations to social support overall, suggest the presence of trauma-specific factors.

The results of the present study suggest that social support is most closely aligned with symptoms of low mood. The relation among these variables is proposed as bidirectional in that social support protects against psychopathology as well as psychopathology reducing social support (Fredman et al. 2017). Considered as a protective factor, the results suggest that social support may protect against psychopathology by addressing symptoms of low mood. Early investigations into social support found that it was most protective against depression after stressful experiences (Aneshensel and Stone 1982; Cohen and Wills 1985). Subsequent work has shown that elevated social support reduces depression symptoms in longitudinal studies (Peirce et al. 2000). More recent work has suggested that social support protects against PTSD symptoms by increasing self-compassion (Maheux and Price 2016), which is conceptualized as construct that opposes low mood (Neff 2003). Alternatively considered as an outcome, the form of psychopathology that most strongly erodes social support is MDD-affective. MDD-affective is closely related to interpersonal avoidance, which likely limits the willingness of individuals to engage in social activities (Joiner 2000). Such social withdrawal may reduce the frequency with which others interact with the affected individual, thus reducing overall perceived social support. The strong relations among the affective factor and other factors provide an indirect pathway by which social support may reduce other symptoms. Further longitudinal work is needed to evaluate such indirect effects.

The variable strength of the association between social support and the factors of multiple disorders has implications for clinical practice. Social support may better protect against symptoms that load on the general distress or affective dimension relative to the specific psychopathology components. These associations would suggest that social support should be leveraged as part of a transdiagnostic treatment for post-trauma mental illness. Several transdiagnostic treatments have been recently presented as a means to provide an integrative treatment for highly comorbid conditions (Farchione et al. 2012; Gros 2014). Integrating a module that improves social support may bolster the efficacy of such treatments. Social support may also improve treatment response when combined with targeted intervention. Recent work has shown that exposure therapy for PTSD may exert its treatment effect primarily through intrusion symptoms (Maples-Keller et al. 2017). Combining exposure with strategies to enhance social support may improve overall treatment response as a result. As evidence of the potential benefit for this strategy, two studies suggested that those with elevated social support at the start of PTSD treatment had greater response than those with less support (Price et al. 2013; Thrasher et al. 2010). As psychopathology may erode social support, however, strategies are needed to improve the interpersonal functioning of those

with significant psychopathology (Cloitre et al. 2010). Additional work is needed to develop such methods and empirically determine if such integration enhances outcomes.

The findings of the present study should be considered within the scope of their limitations. First, all constructs were measured via self-report. Although all measures have excellent psychometric properties, there are inherent biases in the use of self-report. The current study should be replicated using diagnostic interviews. In addition, a general form of social support was assessed. Social support is a multifaceted construct (Sherbourne and Stewart 1991), and the different components of social support may have different relations with psychopathology. The measure used in the current study was unable to assess these different components. Additional studies that can identify how the different components of social support relate to the components of psychopathology are needed. Furthermore, only perceived social support was assessed. The findings may vary when examining the relation between psychopathology and received social support. The sample reported different types of trauma exposure. Although this indicates that the supported relations may exist across numerous trauma types, it is unclear if there are further differences in the relation of social support and psychopathology among victims of a specific type of trauma. The current study used the DSM 5 factor structure for PTSD. Although supported, alternative conceptualizations of PTSD have emerged that propose as many as 7-factors (Pietrzak et al. 2015). Continued work on the factor structure of this disorder is needed, especially studies that evaluate its structure in concert with other disorders. The present study was cross-sectional yet assessed constructs that have longitudinal relations. Replication of this study with repeated assessments is necessary to understand if social support is protective or decreases as a result of psychopathology. Finally, the sample was collected via a web-based crowdsourcing platform. Although prior work has shown that valid and reliable data can be collected via the internet (Kilpatrick et al. 2013; Shapiro et al. 2013), there is the potential for inaccurate information to be collected.

Despite these limitations, the current study provided further evidence for the underlying commonalities for post-trauma psychopathology and for social support as a protective factor against such psychopathology. It also suggests that the extent of the protective effect provided by social support varies across the factors of a given disorder. These results suggested that social support is most closely related to symptoms of low mood, followed by arousal, followed by trauma-specific symptoms. Additional investigations are needed to understand how these different relations influence treatment and natural recovery after a traumatic event.

Acknowledgments

This study was conducted with the support of a University of Vermont APLE Award awarded to Sarah Pallito, Anne Maheux, and Andrew Brown. Dr. Price is supported by K08MH107661-01A1.

References

American Psychiatric Association. The diagnostic and statistical manual of mental disorders, Fifth Edition.: DSM 5. Washington DC: American Psychiatric Association; 2013.

- Aneshensel CS, Stone JD. Stress and depression: a test of the buffering model of social support. *Archives of General Psychiatry*. 1982; 39(12):1392–1396. DOI: 10.1001/archpsyc.1982.04290120028005 [PubMed: 7149899]
- Armour C, Mllerová J, Elhai JD. A systematic literature review of PTSD's latent structure in the Diagnostic and Statistical Manual of Mental Disorders: DSM-IV to DSM-5. *Clinical Psychology Review*. 2016; 44:60–74. DOI: 10.1016/j.cpr.2015.12.003 [PubMed: 26761151]
- Barlow DH, Sauer-Zavala S, Carl JR, Bullis JR, Ellard KK. The nature, diagnosis, and treatment of neuroticism back to the future. *Clinical Psychological Science*. 2014; 2(3):344–365. DOI: 10.1177/2167702613505532
- Borsboom D, Cramer AOJ. Network analysis: an integrative approach to the structure of psychopathology. *Annual Review of Clinical Psychology*. 2013; 9(1):91–121. DOI: 10.1146/annurev-clinpsy-050212-185608
- Borsboom D, Cramer AOJ, Schmittmann VD, Epskamp S, Waldorp LJ. The small world of psychopathology. *PLoS One*. 2011; 6(11):e27407.doi: 10.1371/journal.pone.0027407 [PubMed: 22114671]
- Borstelmann NA, Rosenberg SM, Ruddy KJ, Tamimi RM, Gelber S, Schapira L, et al. Partner support and anxiety in young women with breast cancer. *Psycho-Oncology*. 2015; 24(12):1679–1685. DOI: 10.1002/pon.3780 [PubMed: 25765893]
- Brewin CR, Dalgleish T, Joseph S. A dual representation theory of posttraumatic stress disorder. *Psychological Review*. 1996; 103(4):670–686. [PubMed: 8888651]
- Brown TA. Confirmatory factor analysis for applied research. New York: Guilford Publications; 2015.
- Brown TA, Barlow DH. A proposal for a dimensional classification system based on the shared features of the DSM-IV anxiety and mood disorders: Implications for assessment and treatment. *Psychological Assessment*. 2009; 21(3):256–271. DOI: 10.1037/a0016608 [PubMed: 19719339]
- Bryant RA, O'Donnell ML, Creamer M, McFarlane AC, Clark CR, Silove D. The psychiatric sequelae of traumatic injury. *American Journal of Psychiatry*. 2010; 167(3):312–320. DOI: 10.1176/appi.ajp.2009.09050617 [PubMed: 20048022]
- Byllesby BM, Charak R, Durham TA, Wang X, Elhai JD. The underlying role of negative affect in the association between PTSD, major depressive disorder, and generalized anxiety disorder; *Journal of Psychopathology and Behavioral Assessment*. 2016a. 1–11.
- Byllesby BM, Durham TA, Forbes D, Armour C, Elhai JD. An investigation of PTSD's core dimensions and relations with anxiety and depression. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2016b; 8(2):214–217. DOI: 10.1037/tra0000081
- Cloitre M, Stovall-McClough KC, Noonan K, Zorbas P, Cherry S, Jackson CL, et al. Treatment for PTSD related to childhood abuse: A randomized controlled trial. *American Journal of Psychiatry*. 2010; 167(8):915–924. DOI: 10.1176/appi.ajp.2010.09081247 [PubMed: 20595411]
- Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychological Bulletin*. 1985; 98(2):310–357. DOI: 10.1037/0033-2909.98.2.310 [PubMed: 3901065]
- Contractor AA, Durham TA, Brennan JA, Armour C, Wutrick HR, Christopher Frueh B, Elhai JD. DSM-5 PTSD's symptom dimensions and relations with major depression's symptom dimensions in a primary care sample. *Psychiatry Research*. 2014; 215(1):146–153. DOI: 10.1016/j.psychres.2013.10.015 [PubMed: 24230994]
- Contractor AA, Elhai JD, Fine TH, Tamburrino MB, Cohen G, Shirley E, et al. Latent profile analyses of posttraumatic stress disorder, depression and generalized anxiety disorder symptoms in trauma-exposed soldiers. *Journal of Psychiatric Research*. 2015; 68:19–26. DOI: 10.1016/j.jpsychires.2015.05.014 [PubMed: 26228395]
- Dai W, Chen L, Tan H, Wang J, Lai Z, Kaminga AC, et al. Association between social support and recovery from post-traumatic stress disorder after flood: a 13–14 year follow-up study in Hunan, China. *BMC Public Health*. 2016; 16:194.doi: 10.1186/s12889-016-2871-x [PubMed: 26924178]
- Durham TA, Elhai JD, Fine TH, Tamburrino M, Cohen G, Shirley E, et al. Posttraumatic stress disorder's dysphoria dimension and relations with generalized anxiety disorder symptoms. *Psychiatry Research*. 2015; 228(1):150–155. DOI: 10.1016/j.psychres.2015.04.034 [PubMed: 25983285]

- Elhai JD, Grubaugh AL, Kashdan TB, Christopher B. Empirical examination of a proposed refinement to DSM-IV post-traumatic stress disorder symptom criteria using the National Comorbidity Survey Replication data. *Journal of Clinical Psychiatry*. 2008; 69(4):597–602. DOI: 10.4088/JCP.v69n0411 [PubMed: 18294026]
- Elhai JD, de Francisco Carvalho L, Miguel FK, Palmieri PA, Primi R, Christopher Frueh B. Testing whether posttraumatic stress disorder and major depressive disorder are similar or unique constructs. *Journal of Anxiety Disorders*. 2011; 25(3):404–410. DOI: 10.1016/j.janxdis.2010.11.003 [PubMed: 21129914]
- Elhai JD, Contractor AA, Tamburrino M, Fine TH, Cohen G, Shirley E, et al. Structural relations between DSM-5 PTSD and major depression symptoms in military soldiers. *Journal of Affective Disorders*. 2015; 175:373–378. DOI: 10.1016/j.jad.2015.01.034 [PubMed: 25665497]
- Farchione TJ, Fairholme CP, Ellard KK, Boisseau CL, Thompson-Hollands J, Carl JR, et al. Unified protocol for transdiagnostic treatment of emotional disorders: a randomized controlled trial. *Behavior Therapy*. 2012; 43(3):666–678. DOI: 10.1016/j.beth.2012.01.001 [PubMed: 22697453]
- Fields JA, Nichols LO, Martindale-Adams J, Zuber J, Graney M. Anxiety, social support, and physical health in a sample of spouses of OEF/OIF service members. *Military Medicine*. 2012; 177(12):1492–1497. DOI: 10.7205/MILMED-D-12-00036 [PubMed: 23397694]
- Flora DB, Curran PJ. An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods*. 2004; 9(4):466–491. DOI: 10.1037/1082-989X.9.4.466 [PubMed: 15598100]
- Fredman SJ, Beck JG, Shnaider P, Le Y, Pukay-Martin ND, Pentel KZ, et al. Longitudinal associations between PTSD symptoms and dyadic conflict communication following a severe motor vehicle accident. *Behavior Therapy*. 2017; 48(2):235–246. DOI: 10.1016/j.beth.2016.05.001 [PubMed: 28270333]
- Grant DM, Beck JG, Marques L, Palyo SA, Clapp JD. The structure of distress following trauma: posttraumatic stress disorder, major depressive disorder, and generalized anxiety disorder. *Journal of Abnormal Psychology*. 2008; 117(3):662–672. DOI: 10.1037/a0012591 [PubMed: 18729617]
- Gros DF. Development and initial evaluation of Transdiagnostic Behavior Therapy (TBT) for veterans with affective disorders. *Psychiatry Research*. 2014; 220(1–2):275–282. DOI: 10.1016/j.psychres.2014.08.018 [PubMed: 25193379]
- Gros DF, Price M, Magruder KM, Frueh BC. Symptom overlap in posttraumatic stress disorder and major depression. *Psychiatry Research*. 2012; 196(2–3):267–270. DOI: 10.1016/j.psychres.2011.10.022 [PubMed: 22386220]
- Horowitz MJ. Stress response syndromes: PTSD, grief, adjustment, and dissociative disorders. 5. Lanham: Jason Aronson, Inc; 2011.
- Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999; 6(1):1–55. DOI: 10.1080/10705519909540118
- Joiner TE. Depression's vicious scree: self-propagating and erosive processes in depression chronicity. *Clinical Psychology: Science and Practice*. 2000; 7(2):203–218. DOI: 10.1093/clipsy.7.2.203
- Kass RE, Raftery AE. Bayes factors. *Journal of the American Statistical Association*. 1995; 90(430):773–795. DOI: 10.1080/01621459.1995.10476572
- Kessler RC, Price RH, Wortman CB. Social factors in psychopathology: stress, social support, and coping processes. *Annual Review of Psychology*. 1985; 36(1):531–572. DOI: 10.1146/annurev.ps.36.020185.002531
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*. 2005; 62(6):593–602. DOI: 10.1001/archpsyc.62.6.593 [PubMed: 15939837]
- Kilpatrick DG, Resnick HS, Milanak ME, Miller MW, Keyes KM, Friedman MJ. National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of Traumatic Stress*. 2013; 26(5):537–547. DOI: 10.1002/jts.21848 [PubMed: 24151000]

- Kroenke K, Strine TW, Spitzer RL, Williams JBW, Berry JT, Mokdad AH. The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*. 2009; 114(1–3):163–173. DOI: 10.1016/j.jad.2008.06.026 [PubMed: 18752852]
- Kwako LE, Szanton SJ, Saligan LN, Gill JM. Major depressive disorder in persons exposed to trauma: relationship between emotional intelligence and social support. *Journal of the American Psychiatric Nurses Association*. 2011; 17(3):237–245. DOI: 10.1177/1078390311402498 [PubMed: 21653496]
- Maheux A, Price M. The indirect effect of social support on post-trauma psychopathology via self-compassion. *Personality and Individual Differences*. 2016; 88:102–107. DOI: 10.1016/j.paid.2015.08.051
- Maples-Keller JL, Price M, Rauch S, Gerardi M, Rothbaum BO. Investigating relationships between PTSD symptom clusters within virtual reality exposure therapy for OEF/OIF veterans. *Behavior Therapy*. 2017; 48:147–155. DOI: 10.1016/j.beth.2016.02.011 [PubMed: 28270326]
- McNally RJ, Robinaugh DJ, Wu GWY, Wang L, Deserno MK, Borsboom D. Mental disorders as causal systems: a network approach to posttraumatic stress disorder. *Clinical Psychological Science*. 2015; 3(6):836–849. DOI: 10.1177/2167702614553230
- Miller MW, Wolf EJ, Kilpatrick D, Resnick H, Marx BP, Holowka DW, et al. The prevalence and latent structure of proposed DSM-5 posttraumatic stress disorder symptoms in U.S. national and veteran samples. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2013; 5(6):501–512. DOI: 10.1037/a0029730
- Muthén LK, Muthén BO. *Mplus User's Guide* (Seventh Edition). Los Angeles, CA: Muthén & Muthén; 2012.
- Neff KD. The development and validation of a scale to measure self-compassion. *Self and Identity*. 2003; 2(3):223–250. DOI: 10.1080/15298860309027
- Ozbay F, Johnson DC, Dimoulas E, Morgan CA, Charney D, Southwick S. Social Support and Resilience to Stress. *Psychiatry* (Edmont). 2007; 4(5):35–40.
- Ozer EJ, Best SR, Lipsey TL, Weiss DS. Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychological Bulletin*. 2003; 129(1):52–73. DOI: 10.1037/0033-2909.129.1.52 [PubMed: 12555794]
- Paolacci G, Chandler J. Inside the turk understanding mechanical turk as a participant pool. *Current Directions in Psychological Science*. 2014; 23(3):184–188. DOI: 10.1177/0963721414531598
- Paolacci G, Chandler J, Ipeirotis PG. Running experiments on amazon mechanical turk. *Judgment and Decision making*. 2010; 5(5):411–419.
- Peirce RS, Frone MR, Russell M, Lynne M, Mudar P. A longitudinal model of social contact, social support, depression, and alcohol use. *Health Psychology*. 2000; 19(1):28–38. DOI: 10.1037/0278-6133.19.1.28 [PubMed: 10711585]
- Pietrzak RH, Johnson DC, Goldstein MB, Malley JC, Southwick SM. Psychological resilience and postdeployment social support protect against traumatic stress and depressive symptoms in soldiers returning from Operations Enduring Freedom and Iraqi Freedom. *Depression and Anxiety*. 2009; 26(8):745–751. DOI: 10.1002/da.20558 [PubMed: 19306303]
- Pietrzak RH, Johnson DC, Goldstein MB, Malley JC, Rivers AJ, Morgan CA, Southwick SM. Psychosocial buffers of traumatic stress, depressive symptoms, and psychosocial difficulties in veterans of Operations Enduring Freedom and Iraqi Freedom: the role of resilience, unit support, and postdeployment social support. *Journal of Affective Disorders*. 2010; 120(1–3):188–192. DOI: 10.1016/j.jad.2009.04.015 [PubMed: 19443043]
- Pietrzak RH, Tsai J, Armour C, Mota N, Harpaz-Rotem I, Southwick SM. Functional significance of a novel 7-factor model of DSM-5 PTSD symptoms: results from the National Health and Resilience in Veterans Study. *Journal of Affective Disorders*. 2015; 174:522–526. DOI: 10.1016/j.jad.2014.12.007 [PubMed: 25556669]
- Price M, van Stolk-Cooke K. Examination of the interrelations between the factors of PTSD, major depression, and generalized anxiety disorder in a heterogeneous trauma-exposed sample using DSM 5 criteria. *Journal of Affective Disorders*. 2015; 186:149–155. DOI: 10.1016/j.jad.2015.06.012 [PubMed: 26241663]

- Price M, Gros DF, Strachan M, Ruggiero KJ, Acierno R. The role of social support in exposure therapy for Operation Iraqi Freedom/Operation Enduring Freedom Veterans: a preliminary investigation. *Psychological Trauma: Theory, Research, Practice and Policy*. 2013; 5(1):93–100. DOI: 10.1037/a0026244
- Shapiro DN, Chandler J, Mueller PA. Using mechanical Turk to study clinical populations. *Clinical Psychological Science*. 2013. 2167702612469015.
- Sherbourne CD, Stewart AL. The MOS social support survey. *Social Science & Medicine*. 1991; 32(6):705–714. DOI: 10.1016/0277-9536(91)90150-B [PubMed: 2035047]
- Slade T, Watson D. The structure of common DSM-IV and ICD-10 mental disorders in the Australian general population; *Psychological Medicine*. 2006. 1593–1600. null
- Spitzer RL, Kroenke K, Williams JW, Lowe B. A brief measure for assessing generalized anxiety disorder: the gad-7. *Archives of Internal Medicine*. 2006; 166(10):1092–1097. DOI: 10.1001/archinte.166.10.1092 [PubMed: 16717171]
- Thrasher S, Power M, Morant N, Marks I, Dalgleish T. Social support moderates outcome in a randomized controlled trial of exposure therapy and (or) cognitive restructuring for chronic posttraumatic stress disorder. *Canadian Journal of Psychiatry Revue Canadienne de Psychiatrie*. 2010; 55(3):187. [PubMed: 20370970]
- Tsai J, Elhai JD, Pietrzak RH, Hoff RA, Harpaz-Rotem I. Comparing four competing models of depressive symptomatology: a confirmatory factor analytic study of 986,647 U.S. veterans. *Journal of Affective Disorders*. 2014; 165:166–169. DOI: 10.1016/j.jad.2014.04.075 [PubMed: 24882195]
- Ullman SE, Filipas HH. Predictors of PTSD symptom severity and social reactions in sexual assault victims. *Journal of Traumatic Stress*. 2001; 14(2):369–389. DOI: 10.1023/A:1011125220522 [PubMed: 11469163]
- Watson D. Differentiating the mood and anxiety disorders: a quadripartite model. *Annual Review of Clinical Psychology*. 2009; 5(1):221–247. DOI: 10.1146/annurev.clinpsy.032408.153510
- Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, Keane TM. The life events checklist for DSM-5 (LEC-5). 2013a. Retrieved from http://www.ptsd.va.gov/professional/assessment/te-measures/life_events_checklist.asp
- Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP. The PTSD checklist for *DSM-5* (PCL-5). Scale available from the National Center for PTSD. 2013b. at www.ptsd.va.gov
- Woodward MJ, Eddinger J, Henschel AV, Dodson TS, Tran HN, Beck JG. Social support, posttraumatic cognitions, and PTSD: the influence of family, friends, and a close other in an interpersonal and non-interpersonal trauma group. *Journal of Anxiety Disorders*. 2015; 35:60–67. DOI: 10.1016/j.janxdis.2015.09.002 [PubMed: 26387082]
- Zatzick DF, Rivara FP, Nathens AB, Jurkovich GJ, Wang J, Fan MY, et al. A nationwide US study of post-traumatic stress after hospitalization for physical injury. *Psychological Medicine*. 2007; 37(10):1469–1480. DOI: 10.1017/S0033291707000943 [PubMed: 17559704]
- Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *Journal of Personality Assessment*. 1988; 52(1):30–41. DOI: 10.1207/s15327752jpa5201_2

Table 1

Proportion of criterion A events endorsed for the total sample on the Life Events Checklist

Criterion A Event	Direct exposure	Witnessed in person	Learned about it	Does not apply
Natural disaster	37.4	15.3	18.5	24.6
Fire/explosion	13.2	21.5	20.1	38.3
Transportation accident	58.4	16.3	9.0	12.6
Serious accident	20.1	17.8	16.9	36.4
Toxic substance exposure	5.2	3.1	16.0	61.7
Physical assault	36.1	14.2	15.7	27.0
Assault w/weapon	12.9	8.1	20.5	49.3
Sexual assault	19.5	4.1	24.9	44.0
Unwanted sexual experience	31.3	3.8	15.6	39.9
Combat exposure	2.5	2.9	23.3	60.3
Captive	2.1	1.0	15.9	69.9
Life-threatening injury or illness	13.6	24.7	15.4	37.4
Human suffering	5.5	13.6	17.0	51.3
Sudden violent death	3.1	12.9	29.2	45.5
Sudden accidental death	4.6	13.3	27.1	45.1
Injury caused by participant	3.4	5.8	10.1	69.0
Other stressful event	39.5	7.4	1.0	35.1

N = 712. Numbers represent the percentage of the total sample who endorsed each item response

Table 2

Standardized factor loadings of the PTSD model

Item	Factor	Loading
Intrusive thoughts	Intrusions	0.808
Nightmares	Intrusions	0.842
Reliving trauma	Intrusions	0.855
Emotional cue reactivity	Intrusions	0.876
Physiological cue reactivity	Intrusions	0.884
Avoidance of thoughts and emotions	Avoidance	0.893
Avoidance of external reminders	Avoidance	0.931
Trauma-related amnesia	NACM	0.660
Negative expectations of self, world, others	NACM	0.862
Blame of self or others for trauma	NACM	0.713
Pervasive negative emotional state	NACM	0.862
Loss of interest	NACM	0.874
Feeling detached	NACM	0.873
Lack of positive emotions	NACM	0.902
Irritability/anger	AAR	0.865
Difficulty concentrating	AAR	0.728
Sleep problems	AAR	0.755
Recklessness	AAR	0.839
Overly alert	AAR	0.873
Easily startled	AAR	0.809

NACM, Negative alterations in cognition and mood; *AAR*, Alterations in arousal and reactivity

Table 3

Standardized factor loadings of the depression and GAD models

Item	Loading
MDD (Affective) – Anhedonia	0.859
MDD (Affective) – Depressed Mood	0.902
MDD (Affective) – Worthlessness/Guilt	0.886
MDD (Somatic) – Insomnia/Hypersomnia	0.737
MDD (Somatic) – Fatigue	0.784
MDD (Somatic) – Change in appetite	0.813
MDD (Somatic) – Concentration difficulty	0.858
MDD (Somatic) – Psychomotor agitation/retardation	0.820
GAD – Nervousness/Anxiety/On Edge	0.878
GAD – Uncontrollable worry	0.929
GAD – Excessive worry	0.916
GAD – Inability to relax	0.870
GAD – Restlessness	0.778
GAD – Irritability	0.799
GAD – Fear of negative future events	0.853

Table 4

Relation between each latent variable regressed on social support

Factor	b	SE	β	<i>p</i>
1. PTSD-Intrusions	−0.009	0.002	−0.145	< .001
2. PTSD-Avoidance	−0.009	0.003	−0.138	.001
3. PTSD-NACM	−0.018	0.006	−0.280	< .001
4. PTSD-AAR	−0.017	0.003	−0.263	< .001
5. MDD-Affective	−0.031	0.003	−0.452	< .001
6. MDD-Somatic	−0.023	0.003	−0.350	< .001
7. GAD	−0.021	0.003	−0.316	< .001

NACM, Negative alterations in cognition and mood; *AAR*, Alterations in arousal and reactivity

Table 5

Results of Wald Chi-Square tests of parameter constraints

Comparison A	β	Comparison B	β	Wald χ^2	<i>p</i>
Affective	−0.452	Somatic	−0.350	22.291	<.001
Affective	−0.452	GAD	−0.316	36.185	<.001
Affective	−0.452	NACM	−0.280	26.685	<.001
Affective	−0.452	AAR	−0.263	26.801	<.001
Affective	−0.452	Intrusions	−0.145	67.027	<.001
Affective	−0.452	Avoidance	−0.138	55.284	<.001
Somatic	−0.350	GAD	−0.316	1.978	.160
Somatic	−0.350	NACM	−0.280	3.415	.066
Somatic	−0.350	AAR	−0.263	5.349	.021
Somatic	−0.350	Intrusions	−0.145	26.410	<.001
Somatic	−0.350	Avoidance	−0.138	21.781	<.001
GAD	−0.316	NACM	−0.280	3.415	.065
GAD	−0.316	AAR	−0.263	2.157	.142
GAD	−0.316	Intrusions	−0.145	26.410	<.001
NACM	−0.280	AAR	−0.263	2.157	.142
NACM	−0.280	Intrusions	−0.145	23.137	<.001
NACM	−0.280	Avoidance	−0.138	17.121	<.001
AAR	−0.263	Intrusions	−0.145	16.305	<.001
AAR	−0.263	Avoidance	−0.138	11.205	<.001
Intrusions	−0.145	Avoidance	−0.138	0.055	.815

Affective = depression's affective factor; Somatic = depression's somatic factor; intrusions = PTSD intrusion factor; avoidance = PTSD avoidance factor; Dysphoria = PTSD dysphoria factor; hyperarousal = PTSD hyper-arousal factor; GAD = generalized anxiety disorder factor. Significance $\alpha = .00625$. β = standardized coefficient for the relation between the specified factor and social support