Running Head: PTSD and MDD's Underlying Dimensions

Underlying dimensions of DSM-5 posttraumatic stress disorder and major depressive disorder symptoms

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Abstract

This study examined the relationship between the underlying latent factors of major depression symptoms and *DSM-5* posttraumatic stress disorder (PTSD) symptoms (American Psychiatric Association, 2013). A non-clinical sample of 266 participants with a trauma history participated in the study. Confirmatory factor analyses were conducted to evaluate the fit of the *DSM-5* PTSD model and dysphoria model, as well as a depression model comprised of somatic and non-somatic factors. The *DSM-5* PTSD model demonstrated somewhat better fit over the dysphoria model. Wald tests indicated that PTSD's negative alterations in cognitions and mood factor was more strongly related to depression's non-somatic factor than its somatic factor. This study furthers a nascent line of research examining the relationship between PTSD and depression factors in order to better understand the nature of the high comorbidity rates between the two disorders. Moreover, this study provides an initial analysis of the new *DSM-5* diagnostic criteria for PTSD.

Introduction

Background

Posttraumatic stress disorder (PTSD) and major depressive disorder are highly comorbid. For instance, the National Comorbidity Survey (NCS) found that 48% of individuals diagnosed with PTSD were also diagnosed with major depression in their lifetimes (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). In the NCS-Replication this comorbidity rate was 55% (Elhai, Grubaugh, Kashdan, & Frueh, 2008). An emerging line of research has investigated the relationship between PTSD and depression's latent factors to determine if comorbidity rates can be attributed to the relationships between specific latent factors of each of the disorders (Biehn, Contractor, Elhai, Tamburrino, Fine, Prescott et al., 2013). However, given that this is a new line of research, little is known about PTSD and depression's relationship at the latent level. Furthermore, it is questionable as to how well previous studies examining the combined factor structure of PTSD and major depressive disorder (MDD) will generalize to the newly confirmed *DSM-5* PTSD model (*Diagnostic and Statistical Manual of Mental Disorders*-5th Ed.) (American Psychiatric Association, 2013).

PTSD-Depression Comorbidity

Several theories have been proposed to explain the significant comorbidity rates between PTSD and MDD. Some researchers have pointed to the overlapping symptoms between *DSM-IV* MDD and PTSD (i.e., difficulties with concentration, sleep, and anhedonia) and have suggested that removing the overlapping items may reduce comorbidity rates (Spitzer, First, & Wakefield, 2007). However, Elhai et al. (2008) found that removing overlapping items had negligible effects on comorbidity rates. In addition

to item overlap, the *DSM-IV* diagnostic algorithm for PTSD does not distinguish between symptoms specific to PTSD and those shared with other disorders, which may also contribute to this comorbidity. Although symptom overlap does not appear to be responsible for the comorbidity between PTSD and depression, some of the somatic items of depression have been found to be most related to PTSD's symptom dimensions, including hyperarousal and dysphoria (Biehn et al., 2013; Elhai, Contractor, Palmieri, Forbes, & Richardson, 2011).

Another prevailing hypothesis regarding high PTSD-depression comorbidity is that there is a shared underlying latent factor behind these disorders. Watson (2005, 2009) proposed that mood and anxiety disorders are defined by a higher-order negative affect factor that subsumes a broad range of negative emotional states, including fear, anger, and sadness. Watson proposed that this higher-order factor accounts for high rates of comorbidity among mood and anxiety disorders. Thus, it may be that depression and PTSD are at least partially defined by the same underlying construct - negative affectivity, that gives rise to the high rates of comorbidity. In fact, as discussed below, PTSD has a robust, empirically-supported latent factor of dysphoria that is conceptually similar to the general negative affect construct (Simms, Watson, & Doebbeling, 2002).

Factor analysis can help clarify the nature of comorbidity by examining which underlying factors of one disorder are most correlated with factors of another similar disorder. This line of research can be used to test the construct validity of a disorder (e.g., its uniqueness as a disorder) in a more refined manner than by examining comorbidity between crudely measured, observed diagnostic variables.

PTSD's Factor Structure

PTSD's factor structure has largely been validated using symptom criteria of PTSD from the *DSM-IV-TR* (4th edition- Text Revision; American Psychiatric Association, 2013). The *DSM-IV-TR* organizes the 17 symptoms of PTSD into three symptom clusters of reexperiencing, avoidance/numbing, and hyperarousal. This model has been extensively analyzed, albeit not well-supported, using confirmatory factor analysis (CFA). Indeed, research demonstrates that two other models of PTSD demonstrate superior fit; the emotional numbing model and the dysphoria model (reviewed in Elhai & Palmieri, 2011). The emotional numbing model proposed by King, Leskin, King, and Weathers (1998), which organizes the 17 PTSD symptoms into four intercorrelated factors of reexperiencing, effortful avoidance, emotional numbing, and hyperarousal, is identical to *DSM-IV-TR's* PTSD model except that avoidance and numbing symptoms are separated into two distinct factors. This is consistent with the theoretical and empirical findings that suggest that these two constructs represent distinct factors within PTSD (Asmundson, Stapleton, & Taylor, 2004; Foa, Riggs, & Gershuny, 1995).

The other PTSD model to obtain empirical and theoretical support is the dysphoria model proposed by Simms et al. (2002). In this model, three hyperarousal symptoms (difficulty concentrating, difficulty sleeping, and irritability) are combined with the emotional numbing items to form an eight-item dysphoria construct. Simms and colleagues (2002) based this model on theory positing that there is a general distress or negative affectivity component that includes symptoms of insomnia, irritability, and impaired concentration (Watson, 2005, 2009).

Both four-factor PTSD models have been extensively studied using CFA and have demonstrated good fit among different trauma-exposed samples and using a variety of PTSD instruments (reviewed in Elhai & Palmieri, 2011; Yufik & Simms, 2010). However, given the very recent publication of the *DSM-5* and its altered PTSD criteria, this research to date is predominately based on *DSM-IV-TR*'s conceptualization and diagnostic criteria of PTSD.

Depression's Factor Structure

There is less research regarding the factor structure of depression, and the resulting structure often differs depending on which depression instrument is used to assess depressive symptoms. A commonly used depression measure that does map directly onto *DSM-IV* (and *DSM-5,* in that the diagnostic criteria for depression was not significantly modified for the *DSM-5*) symptom criteria for a major depressive episode (MDE) is the Patient Health Questionnaire-9 (PHQ-9), (Kroenke, Spitzer, & Williams, 2001). Studies using the PHQ-9 have found support for either a unidimensional depression model (Cameron, Crawford, Lawton, & Reid, 2008; Dum, Pickren, Sobell, & Sobell, 2008; Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006; Kalpakjian, Toussaint, Albright, Bombardier, Krause, & Tate, 2009) or a two-factor model (Baas, Cramer, Koeter, Van de Lisdonk, Van Weert, & Schene, 2011; Krause, Bombardier, & Carter, 2008; Krause, Reed, & McArdle, 2010; Richardson & Richards, 2008). However, many of these studies used exploratory factor analysis rather than theoretically-driven CFA.

Only one known study has empirically tested several PHQ-9 depression factor models using CFA (Elhai, Contractor, Tamburrino, Fine, Prescott, Shirley et al., 2012). Using a large epidemiological sample of military service members, this study compared

four competing PHQ-9 models of depression, including a unidimensional model and several two-factor models, with items loading onto a somatic or non-somatic factor. This study found the most support for a two-factor model proposed by Krause, Reed, and McArdle (2010), with one factor comprising five somatic items (sleep changes, appetite disturbances, feeling tired, difficulty concentrating, and psychomotor changes) and the other factor comprising four non-somatic or affective items (anhedonia, depressed mood, suicidal thoughts, and feelings of worthlessness or guilt).

Factor Analysis of Models that Combine MDD and PTSD Factors

Factor analytic studies that have examined the covariation between PTSD and depression latent factors have found that PTSD's factors are correlated most strongly with depression's somatic factor (Biehn et al., 2013; Elhai, Contractor, et al., 2011). This finding has recently led researchers to hypothesize that it is the somatic aspect of these disorders that is contributing to their high comorbidity (Elhai, Contractor, et al., 2011).

This burgeoning line of research has thus far utilized the Simms et al. (2002) dysphoria model of PTSD to examine the latent factors of depression and PTSD. This is because the dysphoria model comprises a dysphoria factor that is conceptually similar to depression. One study of military trauma victims conducted a CFA of depression factors (somatic and non-somatic) and PTSD factors (reexperiencing, avoidance, dysphoria, and hyperarousal), finding that both dysphoria and hyperarousal correlated significantly more strongly with the somatic factor of depression (rs = .69 and .51, respectively) compared to the non-somatic factor of depression (Biehn et al., 2013). Similar results were found in a study that analyzed the factor structure of PTSD and depression (Elhai, Contractor, et al., 2011).

In both studies, PTSD's dysphoria factor and depression's somatic factor demonstrated the strongest inter-correlation. However, it is important to note that other PTSD factors also show strong and significant correlations with depression's somatic factor.

DSM-5's Model of PTSD

The newest edition of the *DSM* was released in May of 2013 and several significant changes to the diagnostic criteria for PTSD were made, including: changes to the traumatic stressor criterion (not discussed in this paper); separation of avoidance and numbing symptoms into separate symptom clusters; and a substantially expanded symptom cluster of negative alterations in mood and cognitions based on the emotional numbing cluster (American Psychiatric Association, 2013; Friedman, Resick, Bryant, Strain, Horowitz, & Spiegel, 2011).

A new symptom cluster entitled "Negative alterations in cognitions and mood" (Criterion D) has been introduced into the *DSM-5* PTSD diagnostic criteria. Symptoms include *DSM-IV* emotional numbing symptoms, as well as new symptoms involving persistent and exaggerated negative expectations about oneself, others, or the world (replacing the perceived foreshortened future item); persistent distorted blame of self or others about the cause or consequences of the traumatic event(s); and pervasive negative emotional state. This symptom cluster now has a greater emphasis on depressive content in addition to the emotional numbing symptoms, so it may be thought of as a hybrid between the emotional numbing factor of the King et al. (1998) model and the dysphoria factor of the Simms et al. model (2002). It is likely that this symptom cluster will have a

greater overlap with depression due its emphasis on trauma related negative affect and cognition, which can include depressogenic affect and cognition.

The final *DSM-5* symptom cluster, "Alterations in arousal and reactivity" (Criterion E), is similar to the *DSM-IV*'s hyperarousal symptom cluster. However, it adds a new reckless behavior symptom and modifies the irritability and anger item to emphasize the behaviors associated with these affects, including verbal and physical aggression.

A study by Elhai, Miller and colleagues (2012) found that the *DSM-5* PTSD model fit the data well. The researchers examined model alterations including a) specifying the reckless behavior item to load onto the mood and cognitions factor, and b) a five-factor model that split the three new mood and cognitions symptoms into a unique factor. Neither model variation resulted in a superior fit to the data above the *DSM-5* model.

Study Aims and Research Questions

The aim of the current study was to analyze the factor structure of PTSD and depression according to *DSM-5*'s symptom criteria. The following research questions were investigated: (1) Do factor analytic results support the symptom groupings as outlined in the *DSM-5* for PTSD? (2) Does the *DSM-5* modified dysphoria model fit better than the *DSM-5* model? (3) What is the relationship between the latent factors of the *DSM-5*'s PTSD model with MDD's latent factors?

Several hypotheses were tested. First, it was hypothesized that the *DSM-5* PTSD model would demonstrate good fit, given results from recent studies (Elhai, Miller, et al., 2012; Miller, Wolf, Kilpatrick, Resnick, Marx, Holowka et al., in press). It was also

hypothesized that the dysphoria model may fit the data better, given the widespread empirical support for the dysphoria model when using *DSM-IV-TR*'s PTSD symptoms (Yufik & Simms, 2010). Third, it was expected that PTSD's arousal factor would correlate more strongly with depression's somatic factor compared to its non-somatic factor, given item overlap between these two factors (i.e., difficulty sleeping and difficulty concentrating) and because of the somatic focus of the arousal factor (Biehn et al., 2013). Next, it was further hypothesized that, in contrast to depression's somatic factor, the non-somatic factor will correlate more strongly with PTSD's mood and cognitions factor given that the latter two constructs both tap into negative affect. Finally, it was hypothesized that the avoidance factor will correlate more strongly with the somatic factor, and the reexperiencing factor will not correlate more strongly with either the somatic or non-somatic factors, given recent empirical findings. These hypotheses are based on results from a study conducted by Biehn et al. (2013). See Table 1 for a list of comparisons undertaken in the present analysis.

Method

Subjects

Participants were undergraduate psychology research subjects from a medium-sized Midwestern university recruited to partake in this online study. All students were administered a question from the Structured Clinical Interview for *DSM-IV* (SCID) (First, Spitzer, Gibbon, & Williams, 1996) PTSD module, which inquires whether the respondent has been exposed to a traumatic event and provides some examples for possible traumas. Only subjects who endorsed the screening question were eligible for study participation. A study had found that the sensitivity of this trauma screen was 66%

and specificity was 87% in a college sample (Elhai, Franklin, & Gray, 2008). This pre-screen was used only to establish study eligibility; trauma exposure and PTSD were more comprehensively assessed in the actual web survey protocol as discussed below.

Materials.

Demographic Survey. Information regarding gender, age, ethnicity, education, employment, relationship status, and household income was collected.

Stressful Life Events Screening Questionnaire (SLESQ). The SLESQ (Goodman, Corcoran, Turner, Yuan, & Green, 1998) was used to assess traumatic event exposure. The SLESQ is a behaviorally specific self-report scale and includes 12 *DSM-IV* PTSD Criterion A1 traumatic stressors. A probing question was added to the witnessed exposure item to clarify whether the traumatic event was witnessed exclusively through electronic media. Furthermore, the question regarding repeated or extreme exposure to gruesome or horrific details of trauma was modified to query whether the trauma was experienced exclusively through electronic media and whether it occurred through one's occupation, so that it is consistent with the *DSM-5*'s diagnostic criteria. The modified SLESQ was administered in a previous study examining the prevalence rates of PTSD using the *DSM*-5 diagnostic criteria (Elhai, Miller, et al., 2012). After completing the SLESQ, respondents were asked to nominate their most distressing traumatic event (if endorsing more than one) for subsequent PTSD inquiry.

PTSD Checklist. The PCL (Weathers, Litz, Herman, Huska, & Keane, 1993) is a commonly used PTSD self-report measure (Elhai, Gray, Kashdan, & Franklin, 2005). Weathers and colleagues adapted the PCL so that items map directly onto *DSM-5* symptom criteria for PTSD (Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013).

Respondents indicated how distressed they were by each symptom over the past month by rating items on a five-point Likert-type scale (1 = "*not at all*" to 5 = "*extremely*"). Respondents were instructed to anchor their ratings to their worst-nominated traumatic event. Thus, this version of the PCL is most similar to the PCL-Specific Stressor version for the *DSM-IV*. The original PCL has demonstrated adequate reliability (α = .94; test-retest *r* = .88) in various trauma-exposed populations including college students (Ruggiero, Del Ben, Scotti, & Rabalais, 2003). The psychometric properties of the PCL are reviewed in articles by McDonald and Calhoun (2010) and Wilkins et al. (2011).

Patient Health Questionnaire-9. Participants completed the PHQ-9 (Spitzer, Williams, Kroenke, Linzer, Verloin deGruy III, Hahn et al., 1994). Traditionally, the PHQ-9 measures depression symptoms over the previous two weeks based on *DSM-IV* major depressive episode symptom criteria. We used a past-month time-frame in accordance with the PCL's time-frame. The PHQ-9 uses a Likert-type scale with four response options ranging from 0 = *"Not at all*" to 3 = *"Nearly every day*" to assess symptom severity. Kroenke et al. (2001) examined validity of the PHQ-9 to detect and assess for depression, and found that internal consistency ranged from .86 to .89. Diagnostic validity was demonstrated in detecting an MDD diagnosis based on structured diagnostic interviews. There have been no proposed changes to the diagnostic criteria for MDD for the *DSM-5*, so no modifications of this measure were necessary.

Exclusion Criteria and Missing Data

A total of 519 subjects participated in the survey. There were 237 who endorsed no *DSM-5* traumatic events and 15 who failed to respond to the item inquiring about their index trauma, so these subjects were excluded from the data analysis. There was one

additional subject who did not answer any items on the PCL and PHQ-9 and the subject was excluded as well, leaving an effective dataset of 266 trauma-exposed subjects. Power analysis based on 100 degrees of freedom determined that a minimum sample size of only 132 would be needed to obtain a power of .80 (MacCallum, Browne, & Sugawara, 1996).

There were nominal amounts of missing data from the PCL and PHQ-9 items. There were 236 (88.4%) complete cases from the PCL and 249 (93.3%) complete cases from the PHQ-9. Thirty participants were missing between 1 to 4 PCL items and 18 participants were missing between 1 to 2 PHQ-9 items. Missing data were treated using maximum likelihood (ML) procedures with the Mplus 6.1 software (Graham, 2009).

Analyses

CFA Analyses. A total of 4 CFA analyses were conducted using Mplus 6.1 software. First, the four-factor *DSM*-5 PTSD model was tested, followed by the four-factor *DSM-5* modified dysphoria model. See Table 2 for the PTSD model specifications. Next, Krause's two-factor depression model of somatic and non-somatic factors was tested. Finally, a combined six-factor model of the *DSM-5* PTSD model and Krause's depression model was tested. For all CFA analyses, error covariances were fixed to zero, and factor variances were fixed to 1 to scale the factors within the model. All tests were two-tailed, with an alpha of .05, and all factors were allowed to correlate.

The PCL and PHQ-9 items were treated as ordinal because these measures have five or fewer response options (Flora & Curran, 2004; Wirth & Edwards, 2007). Therefore, polychoric covariances matrices were created (rather than Pearson covariance matrices) and probit regression coefficients were used. Weighted least squares estimation

with a mean and variance-adjusted chi-square (WLSMV) was used for model estimation, the preferred estimator for ordinal items (Flora & Curran, 2004; Wirth & Edwards, 2007).

The following goodness-of-fit indices were used to determine how well the model fits the sample data: root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI). The established benchmark for RMSEA of .06 or less indicates a close approximate fit, and values between .06-.08 indicate a reasonable fit. CFI and TLI values of .90 or greater were used to indicate a reasonably good fit, and values greater than .95 indicate excellent fit. These empirically-based benchmarks are discussed in several reviews (Hu & Bentler, 1998, 1999).

In order to determine whether the *DSM-5* PTSD or dysphoria model fits the data better, Bayesian Information Criterion (BIC) values were analyzed by recomputing the analyses using ML estimation. Given that models are non-nested (i.e., they are not subsets of each other), the traditional chi-square difference test is inappropriate in this case. BIC values from the two models were subtracted, and a 10-point BIC difference would indicate a 150:1 likelihood that the model with the lower BIC value fits best. A difference of 6 to 10 points indicates "strong" support for the model with a lower BIC value, and a difference greater than 10 points indicates "very strong" support (Raftery, 1995).

Wald Chi-square Tests. For the combined PTSD-MDD model, Wald chi-square tests of parameter constraints (using WLSMV estimation) were used to test whether specific PTSD model factors are more highly correlated with either the non-somatic or somatic factors of the depression model. See Table 1 for the list of pairs of correlations

that were tested. We used a chi-square value with a significance level of $p < .01$ indicating that the difference in the pair of correlations is different from zero.

Results

Demographic Results

The majority of participants were female (n = 194; 72.7%). The average age was 20.59 (SD = 5.64), and most were either Caucasian (n = 203; 76.0%) or African American (n = 62; 23.2%). The remaining participants were either Native American (n = 14; 5.2%), Asian (n = 7; 2.6%) or Hawaiian/Pacific Islander (n = 2; 0.7%). (Respondents were allowed to select more than one racial group so the total percentages did not equal 100%). Nearly half of participants were employed part-time (n = 132; 49.4%), whereas 82 participants were unemployed students (30.7%), and 21 were employed full-time (7.9%). Most participants were currently single (n = 206; 77.2%), while 50 participants were living with a significant other (18.7%), and 7 were married (2.6%). The average years of schooling completed was 12.97 (SD = 1.21).

The most distressing traumatic event endorsed by participants was the death of a family member or close friend to accident, suicide or homicide (n = 116; 43.4%), followed by being present when someone was killed or seriously injured (n = 24; 9.0%), and rape (n = 18; 6.7%). The average PCL score for participants was 42.91 (SD = 17.94); the average PHQ-9 score was 16.22 (SD = 6.10).

CFA Results

The *DSM-5* PTSD model fit the data well, $\chi^2_M (164) = 436.83$, $p < .0001$; RMSEA = .08; CFI = .97; TLI = .97; BIC = 14389.61. Factor loadings ranged from .79 to .87 for the re-experiencing factor, .87 to .93 for avoidance, .47 to .89 for mood and cognitions,

and .74 to .87 for arousal. The dysphoria model also fit well, χ^2_M (164) = 457.64, p < .0001; RMSEA = .08; CFI = .97; TLI = .97; BIC = 14403.99. Factor loadings ranged from .79 to .87 for re-experiencing, .87 to .93 for avoidance, .46 to .88 for dysphoria and .78 to .89 for arousal. Krause's depression model fit well, χ^2_M (26) = 117.913, p < .0001; RMSEA = .12; CFI = .97; TLI = .96. Factor loadings ranged from .76 to .88 for the somatic factor, and .80 to .87 for the non-somatic factor. Finally, the combined PTSD-depression model fit well, χ^2_M (362) = 776.691, p < .0001; RMSEA = .06; CFI = .97; TLI = .96 (see Table 3). The *DSM-5* PTSD model had the lower BIC value, with a difference of 14.38 points, indicating some evidence that the *DSM-5* PTSD model fits the data better. However, it should be noted that limitations regarding the change in BIC values has been found in simulations studies and thus these results must be interpreted with some caution (Preacher & Merkle, 2012).

Wald Tests of Parameter Constraint Results

The hypothesis that PTSD's arousal cluster would correlate more strongly with depression's somatic (r = .783) than the non-somatic factor (r = .712) was not supported at the alpha of .01 level, χ^2 (1) = 4.889, p = .027. We did find support for the hypothesis that the PTSD's mood and cognitions factor would correlate more strongly with depression's non-somatic factor (r = .763) than with the somatic factor (r = .689), χ^2 (1) = 6.744, p = .009.

PTSD's avoidance factor did not correlate more strongly with depression's somatic (r = .573) than non-somatic factor (r = .478), χ^2 (1) = 6.448, p = .011, and the correlation between PTSD's reexperiencing factor and depression's somatic factor (r = .602) was not significantly greater than the correlation between reexperiencing and the

non-somatic factor (r = .551), χ^2 (1) = 2.021, p = .155. See Table 4 for the results of Wald's Chi-Square Parameter results and Table 5 for a list of factor correlations between PTSD's and depression's factors.

Discussion

This study provided an initial analysis of *DSM-5*'s PTSD model and insight into the relationship between PTSD and MDD constructs. Results for the *DSM-5* PTSD model are promising. Although a slightly modified model including a dysphoria factor also demonstrated adequate to excellent fit, BIC differences provide some support that the *DSM-5* model fit the data better. This suggests that the symptoms of difficulty sleeping, difficulty concentrating, and irritability are better explained by the arousal construct than a dysphoria construct in *DSM-5*. However, these results differ from a study conducted by Miller et al. (in press) which found a 15 point lower BIC value for the dysphoria model.

It should be noted, however, that the fit indices for the *DSM-5* PTSD model and the dysphoria model were very similar, Although the BIC values indicate that the *DSM-5* PTSD model provides a somewhat better fit, the overall data from the *DSM-IV* literature still support the dysphoria model conceptualization of PTSD (Yufik & Simms, 2010).

There were strong correlations between PTSD's and depression's factors (ranging from .48 to .78). Unexpectedly, PTSD's arousal and avoidance factors were not correlated more strongly with depression's somatic factor. This finding is in contrast with a previous study conducted by Biehn et al. (2013) which found that PTSD's hyperarousal factor correlated more strongly with depression's somatic factor.

It was expected that the correlation between PTSD's reexperiencing factor and depression's somatic factor would be greater than the correlation between reexperiencing

and non-somatic factors, based on a previous study (Biehn et al., 2013); however, this hypothesis was not supported. The reexperiencing factor is comprised of both somatic symptoms (e.g., physiological reminders of trauma) and non-somatic symptoms (e.g., emotional reminders of trauma, intense recollections of the trauma), which could be responsible for the similarity of correlations. Furthermore, Biehn et al. (2013) utilized a military sample who had experienced combat-related trauma, and combat-related reexperiencing symptoms may be more physiologically distressing (Frueh, Grubaugh, Elhai, & Buckley, 2007) than reexperiencing symptoms that are largely related to the death of a loved one (the predominant index trauma in this study). Also contrary to the initial hypotheses, the correlation between PTSD's avoidance factor and depression's somatic factor was greater than the correlation between the avoidance and non-somatic factors. Because the diagnostic alterations to PTSD's reexperiencing and avoidance symptoms in *DSM-5* are minor, these differences are most likely the result of sample differences between this study and the study by Biehn et al. (2013) rather than differences due to using the *DSM-5* diagnostic criteria.

There was a strong correlation between PTSD's cognitions and mood factor with depression's non-somatic factor. And this correlation with the non-somatic factor is significantly greater than PTSD's correlation with depression's somatic factor. There are conceptual similarities between these factors that explain this significant correlation (e.g., anhedonia, hopelessness). The mood and cognitions factor is similar to the dysphoria factor (i.e., most items relate to negative affectivity), but with the somatic symptoms of dysphoria removed (e.g., difficulty sleeping, difficulty concentrating). Furthermore, the new items that were added to the diagnostic criteria for PTSD in *DSM-5* are related to

negative affect and cognitive depression, and these alterations also make this factor more related to depression's non-somatic factor. Future studies could compare the relationship between depression's factors with dysphoria versus mood and cognitions in order to determine the role that "dysphoric arousal" items (i.e., difficulty sleeping, difficulty concentrating, irritability) have on the correlation between the somatic factor and dysphoria (Elhai, Biehn, Armour, Klopper, Frueh, & Palmieri, 2011).

This study has important implications for *DSM-5.* Results support the construct validity of PTSD in the *DSM-5* and add to the other favorable results of this diagnosis derived from other studies that have investigated the proposed diagnostic alterations to the *DSM-5* (Elhai, Miller, et al., 2012; Regier, Narrow, Clarke, Kraemer, Kuramoto, Kuhl et al., 2013). For instance, Regier et al. (2013) presented the results of the *DSM-5* field trials and found that PTSD demonstrated the second best reliability estimate of the diagnoses investigated (kappa = .69). Interestingly, the reliability of MDD fell into the questionable range of agreement (kappa = .25). The study by Elhai, Miller, et al. (2012) also examined model alterations to the *DSM-5*'s PTSD model and also found that the PTSD model exhibited the best fit to the data.

Changes in the diagnostic criteria for PTSD in *DSM-5* will undoubtedly have implications for the legal system. Some criminal defendants and personal injury claimants will lose PTSD caseness in the transfer from *DSM-IV* to *DSM-5* PTSD diagnosis; others who previously should not have been diagnosed will now be diagnosed. Furthermore, because of the increased focus on depression and dysphoria symptoms in the *DSM-5* PTSD diagnosis, distinguishing between major depression and PTSD in civil and criminal PTSD cases will only get more difficult.

This study is one of the first studies to examine the relationship between the latent factors of depression and PTSD. However, this study utilized a non-clinical college sample for analyses, and thus the results of this study may not generalize to a sample of patients with more severe depression and PTSD, as discussed above. Also, it should be noted that self-report measures of PTSD and depression were used so it was not possible to obtain a clinical diagnosis of PTSD or depression. Other limitations that are inherent in using self-report measures also apply to this study, including potential problems with response validity, social desirability, memory recall, etc. Despite these limitations, this study provides insight into the comorbidity between two of the more frequently occurring mental disorders and provides support for the revised diagnostic criteria for PTSD presented in *DSM-5*.

Future studies should replicate this study using a clinical sample to assess whether the same relationships between PTSD and depression symptoms emerge. Structured diagnostic instruments would also aid this line of research by providing a more accurate diagnostic picture of these disorders. Future studies should also analyze a five-factor "dysphoric arousal" model of PTSD proposed by Elhai, Biehn, et al. (2011) which found that the PTSD symptoms of irritability, difficulty concentrating, and difficulty sleeping form their own unique factor. The dysphoric arousal model of PTSD has demonstrated superior fit over both the emotional numbing and dysphoria models (Armour, Elhai, Richardson, Ractliffe, Wang, & Elklit, 2012; Wang, Long, Li, & Armour, 2011; Wang, Zhang, Shi, Zhou, Li, Zhang et al., 2011), and future studies should determine if this model also demonstrates superior fit over the *DSM-5* PTSD model.

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Table 1. Correlations tested with Wald's Chi-Square test.

Correlation 1	Direction	Correlation 2
Alterations in Arousal with Somatic	>	Alterations in Arousal with Non-Somatic
Negative Alteration in Mood & Cognitions with Non-Somatic	>	Negative Alteration in Mood & Cognitions with Somatic
Reexperiencing with Somatic	=	Reexperiencing with Non-Somatic
Avoidance with Somatic	>	Avoidance with Non-Somatic

Table 2. DSM-5 PTSD Models.

	Models	
PTSD Symptoms	*DSM-5*	*DSM-5*-Dysphoria
B1: Intrusive thoughts	R	R
B2: Nightmares	R	R
B3: Flashbacks	R	R
B4: Emotional cue reactivity	R	R
B5: Physiological cue reactivity	R	R
C1: Avoidance of thoughts	A	A
C2: Avoidance of reminders	A	A
D1: Trauma-related amnesia	NAMC	D
D2: Negative beliefs	NAMC	D
D3: Distorted blame	NAMC	D
D4: Persistent negative emotional state	NAMC	D
D5: Lack of interest	NAMC	D
D6: Feeling detached	NAMC	D
D7: Inability to experience positive emotions	NAMC	D
E1: Irritable/angry	NAA	D
E2: Reckless behavior	NAA	H
E3: Hypervigilance	NAA	H
E4: Easily startled	NAA	H
E5: Difficulty concentrating	NAA	D
E6: Difficulty sleeping	NAA	D

Note. R = Reexperiencing; A = Avoidance; N = Numbing; H = Hyperarousal; NM = Negative Alterations in Mood and Cognitions; NA = Negative Alterations in Arousal; D = Dysphoria.

Table 3. Fit Statistics of the Models Tested.

Fit Statistics	***DSM-5* PTSD Model**	**Dysphoria**	**Krause's Depression Model**	**Combined PTSD-Depression Model**
Chi-Square	χ^2 (164) = 436.83	χ^2 (164) = 457.64	χ^2 (26) = 117.913	χ^2 (362) = 776.691
RMSEA	.079	.082	.115	.066
CFI	.973	.971	.974	.965
TLI	.969	.967	.963	.961
BIC	14389.61	14403.99		

T*able 4. Correlations between somatic vs. non-somatic factors with PTSD factors.*

Correlation between factors	***r* value**	**Wald's Chi-Square**
Reexperiencing and Somatic Reexperiencing and Non-Somatic	.602 .551	χ^2 (1) = 2.021, p = .155
Avoidance and Somatic Avoidance and Non-Somatic	.573 .478	χ^2 (1) = 6.448, p = .011
N.A.M.C. and Somatic N.A.M.C. and Non-Somatic	.689 .763	χ^2 (1) = 6.744, p = .009
N.A.A. and Somatic N.A.A. and Non-Somatic	.783 .712	χ^2 (1) = 4.889, p = .027

Note: N.A. M. C.- Negative alterations in Mood and Cognitions; N. A. A.- Negative alterations in Arousal

Table 5. Factor Correlations for the PTSD and Depression Factors.

	Re-ex.	**Avoid.**	**N.A.M.C.**	**N.A.A.**	**Non-Som.**	**Somatic**
Re-ex.		.851	.782	.798	.551	.602
Avoid.			.727	.706	.478	.573
N.A.M.C.				.905	.763	.689
N.A.A.					.712	.783
Non-Som.						.914
Somatic						

Note: Re-ex = Reexperiencing; Avoid = Avoidance; N.A. M. C.= Negative alterations in Mood and Cognitions; N. A. A. = Negative alterations in Arousal; Non-Som. = Non-Somatic